

# FZID Discussion Papers

**CC Health Care Management**

**Discussion Paper 72-2013**

## **HOW DOES SUBJECTIVE WELL-BEING EVOLVE WITH AGE? A LITERATURE REVIEW**

**BEATRIZ FABIOLA LÓPEZ ULLOA  
VALERIE MØLLER  
ALFONSO SOUSA-POZA**

Discussion Paper 72-2013

**How does subjective well-being evolve with age? A literature review**

BEATRIZ FABIOLA LÓPEZ ULLOA  
VALERIE MØLLER  
ALFONSO SOUSA-POZA

Download this Discussion Paper from our homepage:

<https://fzid.uni-hohenheim.de/71978.html>

ISSN 1867-934X (Printausgabe)  
ISSN 1868-0720 (Internetausgabe)

Die FZID Discussion Papers dienen der schnellen Verbreitung von Forschungsarbeiten des FZID. Die Beiträge liegen in alleiniger Verantwortung der Autoren und stellen nicht notwendigerweise die Meinung des FZID dar.

---

FZID Discussion Papers are intended to make results of FZID research available to the public in order to encourage scientific discussion and suggestions for revisions. The authors are solely responsible for the contents which do not necessarily represent the opinion of the FZID.

(forthcoming in *Journal of Population Ageing*)

## How does subjective well-being evolve with age? A literature review

BEATRIZ FABIOLA LÓPEZ ULLOA\*, VALERIE MØLLER\*\* and ALFONSO SOUSA-POZA\*

**Abstract:** This literature review provides an overview of the theoretical and empirical research in several disciplines on the relation between ageing and subjective well-being, i.e., how subjective well-being evolves across the lifespan. Because of the different methodologies, data sets and samples used, comparison among disciplines and studies is difficult. However, extant studies do show either a U-shaped, inverted U-shaped or linear relation between ageing and subjective well-being.

**Keywords:** Life satisfaction, Ageing, U-shape.

---

\* University of Hohenheim, Institute for Health Care & Public Management, Fruwirthstr. 48, D-70599 Stuttgart, Germany. Corresponding author: Alfonso Sousa-Poza ([alfonso.sousa-poza@uni-hohenheim.de](mailto:alfonso.sousa-poza@uni-hohenheim.de)).

\*\* Quality of Life Studies, Institute of Social and Economic Research, Rhodes University, South Africa.

This paper is based on a keynote address held at the 2<sup>nd</sup> International Workshop on the Socio-Economics of Ageing at the Technical University of Lisbon (2011), as well as lectures held at the Max Planck Institute for Demographic Research (2012) and the Center for Multidisciplinary Research in Aging at the Ben-Gurion University of the Negev (2012). We are thankful for valuable comments made by the participants and by three anonymous referees. The usual disclaimer applies.

## **How does subjective well-being evolve with age? A literature review**

Well-being is supposed to be both the ultimate goal of public policy and what individuals strive for. In the current context of rapidly aging societies, however, the development of well-being as age increases suggests a particularly interesting research agenda relevant not only to policymakers but to all sectors of society. Even though much has been written about the relation between ageing and well-being, this issue continues to be a source of debate among scholars, politicians and the media (see, for example, *The Economist*, 2010). Although researchers have tried to identify patterns of well-being across the lifecycle, they have reached different, and sometimes even contradictory, conclusions.

The purpose of our paper is to describe the mainstream theories on the relation between ageing and well-being from the perspectives of economics, psychology and gerontology and to provide a discussion of the empirical studies on this topic. The primary focus of the paper is the effect that age (or ageing) has on *subjective* well-being (SWB), a factor whose measurement and definition is an extensive research topic in itself and the subject of a wealth of literature that ranges across disciplines and decades. One of the most general interpretations of SWB is that of Diener et al. (1985) who define it as “all of the various types of evaluations, both positive and negative, that people make of their lives” (p. 51), encompassing “cognitive evaluations of one’s life, happiness, satisfaction, positive emotions such as joy and pride, and negative emotions such as pain and worry” (Stiglitz et al., 2009, p.15). It therefore includes not only rational valuations of a person’s life circumstances (e.g. satisfaction) but also emotions, which are more difficult to assess and compare. In this paper, we use the term SWB rather eclectically and refrain from providing or adhering to a precise definition. In this review we also cover a few more recent studies that use “less-subjective” well-being measures to corroborate the more traditional well-being measures used to determine SWB.

The first section of this paper presents a conceptual background that includes economic, psychological and gerontological theories about the relation between well-

being and age. Section two then gives an overview of some of the most relevant empirical findings on this issue, and section three discusses the main conclusions that can be drawn from this review.

## **1 Conceptual frameworks**

Experts in the social sciences have developed various theories that attempt to determine a life-time pattern of well-being. Because of well-being's multidimensional nature, however, the approach to understanding its relation with age varies among disciplines. Nonetheless, there does seem to be some theoretical convergence, at least in terms of findings, across such fields as economics, psychology and gerontology. In these areas, different approaches have produced theories that have more in common than is apparent at first glance.

### *Insights from economics*

The social science of economics, which, at its most general analyses how economies work, is often seen as having a focus on growth. In reality, however, rather than focusing on growth *per se*, it views growth as a means of increasing social welfare. In the words of Oswald (1997, p. 2): "Economic performance is not intrinsically interesting. No-one is concerned in a genuine sense about the level of gross national product last year or about next year's exchange rate. [...] The relevance of economic performance is that it may be a means to an end. That end is not the consumption of beefburgers, nor the accumulation of television sets, nor the vanquishing of some high level of interest rates, but rather the enrichment of mankind's feeling of well-being". (p. 2)

By definition, economics deals with that part of individual and social action that is most closely connected with the attainment and use of material requisites of well-being Marshall (1997). Therefore, to produce measurable results, economics has traditionally focused on pecuniary resources, their deployment, and their distribution and contribution to well-being.

Above all, economics deals with *utility*. It thus assumes that an increase in consumption, income or GDP inherently increases welfare. Thus, the maxim “more is better” is common in the field. Utility, however, cannot be directly observed, so economists focus on analysing individual behaviors, such as consumption patterns, to infer welfare increases or decreases. Rational individuals, they believe, will try to maximise their consumption of goods and services subject to wealth constraints. Theoretically, therefore, under some key assumptions, economists should be able to predict the lifecycle pattern of well-being by solving the typical utility maximisation problem using lifetime constraints. This standard approach is known as *lifecycle theory*.

Lifecycle theory has received much attention from economists since Fisher (1930) first suggested a linkage between consumption plans and income expectations. Later, this linkage was enhanced by the concept of “hump saving,” the idea that individuals would give up consumption in the present to save for future consumption, most particularly for retirement. The model was then more generally adapted for the prediction of savings, consumption and labor supply across the lifespan (Modigliani and Brumberg, 1954).

The lifecycle model argues that, in making their consumption decisions, individuals consider not only their current income, but also their income expectations over their entire lifecycle, from childhood to retirement. Lifetime utility is thus an aggregation of instantaneous utilities, which depend on consumption at that instant (i.e. at a specific age). In its most strict application, the theory assumes that planned consumption is a function of lifetime wealth plus some parameters for age and tastes. According to this theory, maximisation of lifetime utility requires that the well-being gain associated with the consumption of an additional unit (the so-called marginal utility of consumption) should be the same in all periods. How consumption, and thus well-being, changes over the lifespan depends on the nature of the utility functions. If as is often done in standard microeconomic models one assumes that the utility function is additively separable in terms of consumption and age (i.e. it has the form  $utility = v(\text{age}) + u(\text{consumption})$ ), then it can be easily shown that individuals would choose constant consumption throughout their lives, a process known as *consumption*

*smoothing*. Lifetime utility or well-being would then be independent of age and therefore flat across the lifespan. Note that this form of utility function assumes that the utility of consumption is independent of age (i.e. the function  $u$  does not depend on age).

Very little empirical evidence supports the lifecycle theory that, in its simplest form, posits consumption smoothing, which has led some authors to argue that there is no reason to assume that utility of consumption must be independent of age. An alternative, therefore, is to relax this assumption that the marginal utility of consumption is independent of age. As pointed out by Blanchflower and Oswald (2008, p. 1735), “There seems no reason why the marginal utility of consumption would be independent of a person’s age. One might believe that young people wish to signal their status to obtain mates, and, therefore, might have a greater return from units of consumption than the old [...] Alternatively, older people may have more need of health and medical spending, so the marginal utility of consumption is greatest in old age.” If one relaxed this assumption, then consumers would adapt their consumption to periods in which the utility they receive from consuming is higher. Consumption and thus well-being would then vary across the lifespan.

One leading economist in the area of life satisfaction and ageing is Richard Easterlin, whose findings initially supported the idea that happiness is essentially flat throughout the lifecycle. The socio-economic principle he proposed at that time (now known as the *Easterlin paradox*) maintains that economic growth, measured in per capita income, does not ultimately translate into increased well-being because people adapt to better life situations relatively quickly. Besides claiming that his results prove “the adaptability of mankind,” Easterlin (1974) also quoted George Homans’ dictum that “any satisfied desire creates an unsatisfied one” (p. 119).

Well-being, Easterlin therefore posited, is only slightly increased if an individual’s income is raised *relatively* to the incomes of others. This point was further explained by economists Frey and Stutzer’s (2002) *aspiration level theory*, which argues for a strong correlation between increases in income and rises in aspiration levels. Human beings, the authors contend, are constantly comparing their current situation to past situations and their expectations of the future. In improved circumstances, they

rapidly adapt their expectations and are therefore less happy in the long run. In Frey and Stutzer's own words, "[a] rise in our income initially provides a surge of satisfaction, but after some time we get accustomed to it and are not happier than before" (*ibid.*, p. 78). As a result, higher levels of well-being are often transitory across the lifespan.

The idea that well-being is relatively smooth along the lifespan has also found detractors in the realm of economics. Indeed, it seems tenuous to believe that individuals are equally happy regardless of the conditions in which they live. Easterlin (2005) himself reassessed his earlier findings and proposed that happiness depends on two types of factors: pecuniary and non-pecuniary. Pecuniary factors are those to which people can completely adapt, like income; non-pecuniary factors are those that, like marriage, disability, and long-term unemployment, can cause long-term changes in the individual's well-being. The effects of such changes are examined in Clark et al.'s (2004) study of the effects of long-term unemployment on life satisfaction, which indeed found that individuals did not return to their original level of well-being after this type of change.

The fact that economic models can be manipulated to include extra assumptions, which can in turn change the observed shape of a lifetime satisfaction curve, allows for contrasting conclusions. Indeed, it seems that "economic theory leaves open room for every structure of well-being over age" (van Landeghem, 2008, p. 4), and that "textbook economic analysis is not capable [...] of producing unambiguous predictions about the pattern of well-being through life" (Blanchflower and Oswald, 2008, p. 6).

### *Insights from psychology*

In recent years, one branch of psychology, which focuses on analysing life satisfaction and well-being across the lifespan, has contributed important insights to this discussion. Much attention has been given in psychology to the *set point theory*, which argues that individuals are born with a predisposition to a certain level of happiness, based on genetics and personality. Even life-changing events, such as



marriage or the death of a loved one, only have temporary effects on the individual's life satisfaction, which after a while will return to the original, biologically-determined level. This process, called *hedonic adaptation*, is defined as "the process by which individuals return to baseline levels of happiness following a change in life circumstances" (Lucas, 2007, p. 75). Even as early as 1999, Diener and Lucas (1999, p. 227) argued that "the influence of genetics and personality suggests a limit on the degree to which policy can increase subjective well-being [...] Changes in the environment, although important for short-term well-being, lose salience over time through processes of adaptation, and have small effects on long-term subjective well-being". Therefore, all individuals in society have different but stable levels of well-being, which are not supposed to change across the lifespan.

Many psychological studies seem to support this theory, which was initially set out by psychologists Brickman and Campbell in the 1970s (see Campbell et al., 1976). Originally, these scholars' research aimed at understanding why groups of people with very different access to resources (i.e. very rich people and very poor people) seemed to have similar levels of happiness. To explain this phenomenon, they developed the *adaptation-level theory* of well-being and proposed what is now known as the *hedonic treadmill* or *hedonic adaptation* theory (Kahneman, 1999). According to this perspective, even after major life events like winning the lottery or becoming paraplegic, individuals return to a 'baseline' level of well-being (Brickman et. al., 1978; Kahneman, 1999). This theoretical framework was then complemented by Costa and McCrae's (1980) *personality theory of well-being*, which specified that individuals are born with certain personality traits that do not change significantly across the lifespan. Supporting research by Myers and Diener (1996, p. 54) found, for instance, that "the even distribution of happiness cuts across almost all demographic classifications of age, economic class, race, and educational level" and that "happiness does not appear to depend significantly on external circumstances".

To further explore the hereditary aspect of happiness, Lykken and Tellegen (1996) analysed the lives, personality traits and reported well-being of twins. Their findings seemed to confirm that hereditary characteristics are very strong determinants of life satisfaction, accounting for 50% of the variance in well-being. In further studies,

Lykken (2000) even concluded that close to 100% of the variance in well-being can be accounted for by hereditary traits.

The field of genoeconomics, a new field of study based on this research, has recently emerged to combine genetics and economics to explore and better understand decision-making processes and their inheritability, especially economics-related decisions and traits. One underlying motivation for this research is that behavioural geneticists have produced a “compelling array of evidence that there is genetic variance in economic behaviors, outcomes, and preferences” (Beauchamp et al., 2011, p. 59). Most of these studies are based on twins and siblings because researchers are better able to control for genetic and environmental conditions.

Important evidence for set-point theory was delivered by De Neve et al. (2010), who showed that individuals do indeed “exhibit a baseline level of happiness”. Specifically, these researchers illustrated that individuals with a longer version of the serotonin transporter gene (SLC6A4) tended to report higher levels of happiness (*ibid.*). In fact, their study, which used twins and genetic associations, showed that around 33% of the variation in self-reported well-being is genetically explicable. Conversely, even though demographic variables like socio-economic status, income, marriage, education and religiosity are significantly associated with individual happiness, no demographic variable typically accounts for more than 3% of the variation in self-reported well-being (Frey, 2008).

According to psychologist Richard Lucas, there are three main arguments in favour of the set-point theory of life satisfaction. First, evidence usually shows long periods of constant levels of life satisfaction, even under changing circumstances. In fact, up to 40% of the variance in life satisfaction measures is stable in periods of up to 20 years (Lucas 2007, p. 76). Second, over 80% of the variables that determine well-being are inheritable, which leaves only 20% of the variance accounted for by demographic factors (*ibid.*). Third, personality variables, such as “extroversion and neuroticism, are relatively strong predictors of happiness” (*ibid.*).

Nevertheless, while exploring individual adaptation to major life events, Lucas also found some contradictory evidence; namely, that well-being levels do in fact change

over time and these changes appear to be permanent. The major events that precipitate such changes include marriage, unemployment and disability (Lucas, 2007, pp. 76-77), similar to the findings of Easterlin. Lucas thus concluded that long-term levels of happiness do change but still appear “moderately stable over time” (*ibid.*, p. 77). Nonetheless, he emphasised that these results “do not refute the set point model of happiness” (*ibid.*, p. 78). He therefore does not reject the theory but argues in favour of developing it further to allow for certain adaptations to life circumstances.

Some scientists have, however, found evidence of particular circumstances that can have a serious effect on the path of well-being across the lifespan (Headey and Wearing, 1989; Headey, 2008). Among these, Winter et al. (1999) maintained that individuals still suffer from the consequences of divorce or marriage long after the event and do not return to their original level of happiness. Easterlin (2006a) also reported that “adverse health changes have a negative and lasting effect on subjective well-being” (p. 39). Likewise, Huppert (2005, p. 318), in proposing that individuals have emotional reactions of different magnitude that can alter well-being, argued for the existence of evidence “that our set point for happiness is less set than some have supposed”. She also showed that individuals with the same genes manifest different levels of life satisfaction, which argues against the hypothesis of a hereditary baseline level of life well-being.

### *Insights from gerontology*

Gerontology, the study of ageing, has made important contributions that have enriched the study of well-being across the lifespan, especially with regards to the levels of well-being among older individuals. On an intuitive level, common sense dictates that well-being should decrease among older individuals, not least because health diminishes substantially. That is, advancing age compromises not only physical but also mental capabilities. On the whole, individuals are not as self-sufficient as in their younger years. They exit the labour market and depend on fixed pensions that limit the amount of financial resources at their disposal, and as they frequently experience the death of friends and loved ones, they become more

socially isolated (Williams, 1977). Yet, according to much gerontological research, “well-being seems to be unaffected by the adverse contexts brought on by the ageing process” (Mroczek and Kolarz, 1998, p. 1333).

This phenomenon, known as the *satisfaction paradox* or “stability despite loss” paradox, tries to explain the disconnect inherent in the relatively high levels of subjective life satisfaction reported by elderly living in objectively relatively bad conditions. The gerontological literature notes that this so-called paradox might be caused by age-cohort effects – that is, older people may report higher levels of life satisfaction because of the lower expectations of a particular generation (Walker, 2005, p. 4).

An alternative explanation is Charles and Carstensen’s (2009) *socio-emotional selectivity theory*, which argues that individuals experience more life satisfaction as age increases because, with passing time and shrinking time horizons, they spend more time in activities that contribute to their well-being instead of pursuing goals that are expected to pay off in the future. Put simply, because older people are more aware of mortality, they try to focus on things that contribute to their current happiness. As a result, older individuals have a “selective attention to the positive [which] might explain why [they] report the less amount of distress in day-to-day lives, are less likely to be depressed, and experience lower rates of phobia than younger people do” (Munsey, 2007). Additionally, older people tend to have fewer but more rewarding social contacts, which allows them to better control their emotional health (Berg et al., 2006).

Other researchers of the elderly have reached similar conclusions. For instance, Argyle (2001) found evidence that happiness increases slightly with age, mainly due to a declining goal-achievement gap. In other words, as time goes by, individuals realise that their expectations were probably set too high in their younger years and learn to accept the reality of their lives. Likewise, Diener et al. (1999, p. 291) concluded that “life satisfaction often increases, or at least does not drop, with age”.

In a related train of thought, the *selection, optimisation and compensation* (SOC) model attempts to highlight the factors that contribute to successful ageing and high

levels of well-being among the elderly (Baltes and Baltes, 1990). According to the SOC model, “successful aging encompasses *selection* of functional domains on which to focus one’s resources, *optimizing* developmental potential (maximization of gains) and *compensating* for losses – thus ensuring the maintenance of functioning and a minimization of losses” (Freund, 2002). One underlying assumption of this model is that internal and external resources are depleted as people age, often making it more difficult for individuals to shape their environment according to their goals. Selecting realistic goals becomes important, and empirical evidence shows that focusing on a selected few life domains “is particularly adaptive for those older people whose resources are highly constrained” (Freund, 2002).

Broadly speaking, the gerontology literature on well-being in old age stresses the ability of older people to adapt to their circumstances. This adaptive capacity often declines among the very old, i.e. among the “oldest old” or those in the “fourth age” (Baltes and Smith, 2003), and accordingly, empirical evidence also suggests that there is a significant decline in well-being among the oldest old (Gwozdz and Sousa-Poza, 2010). As technology today allows severe disability to be delayed to older ages, one can assume that this decline will, in subsequent generations, arise at an even higher age.

## **2 Empirical evidence**

Authors in different fields have empirically analysed the relation between age and well-being and three main trends have been identified: a U-shape (convex), an inverted U-shape (concave) and linearity. In this section, we outline some of the most relevant literature supporting each of these positions. It should be stressed that the empirical studies that we are aware of do not, in essence, try to test the theories discussed above and it is most probably no trivial task trying to discriminate among the various theories.

### *U-Shaped Relation*

In recent years, a number of authors, especially economists, have identified a U-shaped relation between age and reported life satisfaction. In these analyses, well-being is believed to reach its minimum between a person's mid-30s and early 50s (e.g. van Landeghem, 2012; Blanchflower and Oswald, 2008). A number of reasons have been given for this observation, including: (i) the possibility that younger individuals have higher expectations than their elders that are not met; (ii) older individuals learn to adapt to their strengths and weaknesses and thus have more realistic aspirations; (iii) and happy people live longer. These reasons could all contribute to a reduction of well-being in younger years and an eventual increase as individuals age.

One of the first attempts to examine this relation was Clark and Oswald's (1994) study of a 1991 cross-section of the British Household Panel Survey and the General Health Questionnaire. The evidence indicates a U-shaped relation between both variables for both data sets, with a minimum life satisfaction reached around a person's mid-30s. In a later study using the U.S. General Social Surveys, Oswald (1997) again found evidence of a U-shape with a minimum reached in the 30s.

Frey and Stutzer (2002), in their meta-analysis of the economic quality-of-life literature, also concluded that a convex relation exists between life satisfaction and age, claiming that "the young and the old are happier than the middle-aged" (p. 54). In their study, after regressing happiness on age and controlling for other demographic factors like income, marital status, employment and health, they found that the minimum level of life satisfaction is reached between an individual's 30th and 35th year.

Deaton (2007, 2008) explored cross-sectional data from the 2006 Gallup World Poll and showed that the age profiles of self-reported life satisfaction differ from country to country. Although his analysis is descriptive and does not control for covariates, the use of the World Gallup Poll data allowed for cross-country comparisons and encompassed nationally representative samples of individuals from over 130 countries. By observing general life satisfaction among individuals from different age

groups, Deaton (2008) concluded that the U-shaped relation is present solely in rich, English-speaking countries in which the elderly are relatively satisfied with their lives. In his words, “for most of the world, life satisfaction declines with age; the exceptions being among the very highest-income countries – including the United States, Canada, United Kingdom, Australia, and New Zealand – where life satisfaction is U-shaped with age, falling at first and rising after middle age” (*ibid.*, p. 8).

Although a broad body of literature supports the existence of a U-shaped relation, most such analyses are based exclusively on cross-sectional data. For example, Di Tella et al. (2001) used multiple regressions and cross-sections to confirm the U-shaped relation between age and reported well-being in developed countries. However, the problem with cross-sectional analyses is that the convex relationship might be due to omitted cohort effects in the variable that measures age. That is, a generation born in particularly difficult or prosperous times might report levels of life satisfaction that are lower or higher than the levels reported by other generations.

To counteract this criticism, researchers have tried to analyse the robustness of the U-shape in a longitudinal design using such longitudinal data sets as the German Socio-Economic Panel (since 1984) and the British Household Panel Survey (since 1991). In their 2006 study, Clark and Oswald tested the validity of the U-shaped relation using longitudinal data from the British Household Panel Survey and the British General Health Questionnaire. Their data sets ranged from 1991 to 2004 and covered over 100,000 individuals. After using fixed effects to control for individual heterogeneity, the authors confirmed the U-shaped relation between reported well-being and age with one difference from their previous findings in that minimum life satisfaction occurred in the mid-40s, not the mid-30s. Even after controlling for myriad variables they found consistent evidence for the U-shape, with a minimum reached between 40 and 49 years of age.

To determine whether this U-shaped relation reflects individuals’ reactions to typical events in the lifecycle or is due to unobserved cohort effects, Clark (2007) controlled for cohort effects using fixed-effects estimations in panel regressions on 14 waves of the British Household Panel Survey. Estimation with fixed effects still gave rise to a U-shape, although the curvature was not as pronounced.

Using panel data from 1996-2000 and 2002-2004 from the British Household Panel, a more recent study by McAdams et al. (2012) used an innovative approach that analyses eight individual domains of life satisfaction: health, income, housing, partnership, job, social life, amount of leisure time, and use of leisure time. Age trajectories diverged considerably across these domains, but in general, satisfaction with social life, housing, amount of leisure time and use of leisure time showed a U-shape pattern with age. When aggregating all eight domains, a pattern resembling the U-shape of overall life satisfaction also emerged. The authors concluded that “this pattern is consistent with the idea that people are constructing overall evaluative judgements in a more bottom-up fashion” (McAdams, 2012, p. 301).

Blanchflower and Oswald (2008) tested the robustness of the U-shape using a set of dummy variables for each birth decade to account for cohort effects in a sample of over 500,000 individuals in America (U.S. General Social Surveys, 1972–2006) and Europe (Eurobarometer Surveys, 1976–2002; UK Labour Force Survey, 2004–2007). Although the authors controlled for such demographic and economic variables as marital status, race, children, education level and employment status, they could not control for health. They did however test whether the data had a quadratic form in age and concluded that the U-shaped relation between age and reported life satisfaction holds despite the inclusion of cohort effects. In the United States, when cohort effects were not taken into account, males reach their minimum life satisfaction at 35.7 years of age, but once cohort effects were controlled for, this minimum moved forward to 52.9. Women, on the other hand, reached a minimum at 38.6 even when cohort effects are accounted for. In Europe, well-being reached a minimum at 44.5 without cohort effects and at 46.5 with cohort effects. Blanchflower and Oswald also examined the relation between age and well-being (proxied by mental health) using only the UK Labour Force Survey and showed that depression and anxiety reaches a maximum around age 46, which is consistent with previously reported results.

When testing the robustness of the U-shape in developing countries, Blanchflower and Oswald (2008) found evidence that the curvilinear relationship seems to partially hold there as well. Using four waves of the World Values Survey, the



Latinobarometers, and the Asiabarometers, they followed a similar methodology to that used for the American and European data. In addition to controlling for employment status, marital status, years of education and income, the authors used dummies for countries and years. They found that “the U-shape seems to occur in the majority of nations,” which in their analysis totalled 72, but not in 20 developing countries, an outcome whose insignificance they attributed to the small sample sizes (*ibid.*, p. 13).

Using data from the German Socio-Economic Panel (1985–2007), Van Landeghem (2008, 2012) examined the validity of the U-shaped relation from the perspective of different econometric methods with special attention to model specification problems. First, he used pooled OLS with and without controls and found that without controls, well-being reaches a minimum between 42 and 52 years of age, whereas with controls, the minimum is reached later, around the age of 60. His data also illustrated a second turning point in life, around age 70, a finding consistent with Gwodz and Sousa-Poza (2010) in Van Landeghem (2012), in which he aimed to identify the second derivative of well-being with respect to age. This study shows positive second derivative until midlife, which implies convexity and is thus in line with a U-shaped pattern.

Three recent studies have used “non-subjective” data to assess the U-shape relation, namely Blanchflower and Oswald (2011), Lang et al. (2011), and Weiss et al. (2012). The use of such data can be seen as “a powerful and independent corroboration of the claim in the well-being literature that happiness and mental health follow an approximate U-shape through life” (Blanchflower and Oswald, 2011).

Blanchflower and Oswald (2011) used data from the 2010 Eurobarometer survey in order to analyse the effect of age on the probability of taking antidepressants. With a sample of over 16,000 individuals in 27 countries, the study shows that the probability of taking antidepressants follows an inverted U-shape pattern with a peak the late 40s. “People in their mid-life are approximately twice as likely to be taking antidepressants as individuals with the same characteristics who are under the age of 25 or over the age of 65” (Blanchflower and Oswald, 2011, p. 15). This result is consistent with a U-shape pattern of (mental) well-being and age.

Lang et al. (2011) analysed pooled data from the Health Survey for England collected between 1997 and 2006. With a sample of approximately 100,000 individuals, they assessed the prevalence of diagnosed mental illness and receipt of prescribed psychiatric medication. Diagnoses, treatments and prevalence of psychological distress rose with age until early middle age and declined subsequently. This result is, however, specific to low-income groups.

A recent study by Weiss et al. (2012) analysed the well-being of a sample of 508 great apes housed in zoos, sanctuaries and research centers in four countries. The well-being of the apes was reported by zoo keepers, volunteers, researchers, and caretakers who had known the apes for at least two years. Well-being was assessed using a 4-item questionnaire on a 7-point scale. The results support a U-shape relation with minimums at around 30 years of age, comparable to human well-being minima of approximately 45-50 years. This result is particularly interesting as it highlights the possibility that “the U-shape found in human studies of age and well-being evolved in the common ancestors of humans and nonhuman primates” (Weiss et al., 2012, p. 2).

### *Inverted U-Relation*

Contrary to the U-shape, very limited evidence on an inverted U-shape exists. Mroczek and Spiro (2005) included only males between 40 and 85 years of age in their analysis of data from the Veterans Affairs Normative Ageing Study, one of the first panel analyses (22 waves) to explore the relation between ageing and reported well-being measured by positive affect. Their results show an inverted U-shaped relation between age and positive affect in which well-being grows throughout midlife and peaks around age 65. Thereafter, it falls steadily. They also concluded that one year before death, reported positive affect decreases dramatically. It must be stressed, however, that this pattern is consistent with the U-shaped relation that reaches a maximum at around 65 years.

One of the most influential studies in support of an inverted U-shape is Easterlin's (2006b) investigation of a possible lifecycle pattern of well-being in the United States and the factors responsible for it. Using data from the United States General Social Surveys (1973–1994), he applied a “domains of life approach” to analyse the variables happiness, financial satisfaction, job satisfaction, family satisfaction and health satisfaction. After regressing happiness on age while controlling for birth cohort, gender, race and education, Easterlin concluded that “happiness is greatest at midlife, but not by a great deal. On average, it rises as people progress from 18 to 51 and declines thereafter” (*ibid.*, p. 471).

Easterlin and Sawangfa (2007) developed this hypothesis further using the same panel data for the United States and regressing happiness on age while controlling for socio-demographics like year of birth, gender, race and education level. Their results confirm a slightly inverse U-shaped relation between happiness and age, with maximum happiness being reached around the 50th year of life. The variation, however, is very small: the scale of the happiness variable is 1 to 3, and the actual variation is of only one decimal point. The authors therefore concluded that “happiness is fairly constant over time” (*ibid.*, p. 1).

### *Linear Relation*

A linear relation between reported well-being and age has also been observed, though it can be constant throughout the lifecycle or sloping upward or downward. Costa et al.'s (1987) 9-year longitudinal study based on data from the National Health and Nutrition Examination Survey is one study that confirms this viewpoint. Using diverse multivariate regressions, both cross- and time sequential, on data from individuals aged between 25 and 74, these authors found no significant age, cohort or time effects on reported well-being in any of their analyses. They concluded that “the present data provide compelling evidence for the stability of levels of well-being in adulthood” (*ibid.*, p. 55).

In their meta-analysis of (primarily psychological) empirical studies on happiness, Myers and Diener (1995) also reached the conclusion that there is an even distribution of reported well-being over age. According to their review, life satisfaction does not seem to depend significantly on outside circumstances but rather is based on personality traits and positive and negative affects that are usually time invariant. They thus defended the claim that “no time in life is notably happiest or unhappier than others” (*ibid.*, p.11).

All these studies, by arguing in favour of relatively constant well-being throughout the lifecycle, seem to support the psychological set-point theory of life satisfaction. Nonetheless, other empirical studies have delivered contradictory results. Deaton (2008), for example, in his analysis of 2006 World Gallup Poll data, concluded that outcomes for the relation between age and life satisfaction differ across countries. His results indicate that life satisfaction declines with age in middle income and transition countries, where health satisfaction seems to be affected more negatively by age than in richer countries. He thus concluded that “for most of the world, life satisfaction declines with age” (*ibid.*, p. 8), and that this decrease is stronger in middle-income countries and the strongest in former Soviet countries, where the elderly seem to be the most dissatisfied age group of all. In low-income countries, the decline in life satisfaction with age is not as strong. He attributed these differences specifically to cohort effects.

Similar conclusions were reached by Carmel (2001, 2011) and her team, who conducted four large-scale empirical studies to test the hypothesis that the will to live is a reliable indicator for life satisfaction among the elderly. All these studies, two using cross sections and two using longitudinal data, were based on information on the elderly in Israel. The researchers assessed the will to live using both single and multiple item scales. The single-item results confirm a strong correlation between the will to live and diverse indicators of well-being such as self-esteem, happiness, life satisfaction, health and physical functioning, and this association is supported by the multiple item outcomes. The will to live was significantly but negatively correlated with age, indicating that it diminishes as age increases.

Similarly, as discussed previously, when Van Landeghem (2008) attempted to corroborate the validity of the U-shaped relation between age and life satisfaction using German Socio-Economic Panel Data, he found the results highly sensitive to model specification problems. When he used pooled OLS, the U-shape held, but when he controlled cohort effects with fixed-effects estimation, the U-shape disappeared and the curves sloped upward with age. He thus concluded that “the U-shape is less supported in a longitudinal setting, and that the shape of the effect of ageing on subjective well-being seems to be sensitive to the specification [...] suggesting the importance of time-varying as well as time-invariant factors to determine life satisfaction” (*ibid.*, pp. 3, 15). Using data from longitudinal surveys (the British Household Panel, the German Socio-Economic Panel, and the “Household, Income and Labour Dynamics in Australia” Survey), two recent studies by Frijters and Beatton (2012) and Kassenboehmer and Haisken-DeNew (2012) show that the use of fixed-effects models causes the U-shape to disappear.

Gwozdz and Sousa-Poza (2010) reached very similar conclusions in their analysis of 13 waves of the German Socio-Economic Panel Data (1994–2007). In this study, using the methodology proposed by Clark (2007), they estimated a fixed-effects model to control for cohort effects while also controlling for other socio-demographic variables such as marital status, number of children, employment status and education. After first estimating two cross-sectional models, one with and one without controls, they compared these outcomes to those of a longitudinal model that accounts for individual heterogeneity using fixed effects. Their results show that when the estimation is based on pooled regressions, most age dummies are significant and produce a U-shape. Only after the age of 75 does life satisfaction seem to rapidly decrease, reaching the lowest level at the oldest ages. When the estimation uses fixed effects, however, the U-shape vanishes. Again, only among the oldest old (after 85 years), does there seem to be a pure age effect that causes life satisfaction to decrease steeply. The authors thus concluded that, at least in Germany, the U-shape is likely to be caused by cohort effects or unobserved individual characteristics that are constant over time.

Offering another angle, Stone et al. (2010) analysed hedonic well-being in the United States with more than 300,000 observations from the 2008 Gallop Poll. As opposed

to global well-being, which assesses an overall judgement of one's life, hedonic well-being captures affective components of well-being such as the experience of happiness or stress. Such hedonic measures "may yield a different view of aging because it is less influenced by the cognitive reconstruction inherent in global well-being measures and because it includes both positive and negative components of well-being" (Stone et al., 2010, p. 9985). Their analysis shows that, although global as well as positive hedonic well-being is U-shaped, negative hedonic well-being is not. Feelings of stress and anger decline with age, feelings of worry are elevated through middle age and then decline, and feelings of sadness are in essence flat.

### **3 Discussion and Conclusions**

The aim of this paper has been to review the literature on the relation between subjective well-being and ageing; that is, how subjective well-being evolves across the lifespan. An overview of the empirical studies on this topic discussed above is also given in the appendix. As our review has indicated, drawing general conclusions is difficult as papers use different data sets, methodologies and samples. Nevertheless, we offer several general observations.

Cohort effects – because they refer to data trends that arise because individuals were born at a particular point in time under particular circumstances that differ from those of individuals born at different times – do seem to matter. In fact, observations suggest that even though well-being could be constant over the lifecycle, "people born in different years report, on average, a different level of life satisfaction [...] or two cohorts might be equally happy but still report a different value of life satisfaction" (Schilling, 2005, p. 4). For example, an individual born in Germany during the first half of the twentieth century, who lived through the hardships of the Great Depression and the two World Wars, could feel that the second half of the century, with its economic and social progress, was much better (*ibid.*). This individual, therefore, would report much higher life satisfaction than individuals born after the 1950s. Accounting for cohort effects, therefore, allows researchers to eliminate time or period differences and deliver a "pure" ageing effect, if one exists. Such cohort

effects, however, cannot be effectively controlled in cross-sectional analyses and require longitudinal data and additional assumptions (Van Landeghem, 2012). Yet several studies on this topic reviewed here are based on cross-sections.

Selection of control variables, a decision that in turn depends on the underlying research objective, is also very important. Are we, for example, interested in the general trend of life satisfaction across the lifespan or do we want to assess the “pure” age effect – one that, all other explanatory variables kept constant, would explain the U-shape as a reflection of “the passage of individuals through various stylized life events” (Clark 2007, p. 3). If this “pure” age effect is to be isolated, health or physical vitality must be controlled for. Yet, data on health or physical vitality are not always readily available, and most studies fail to adequately account for these variables. Easterlin (2006b, p. 465) deliberately avoids controlling for health on the grounds that “if one wants to know whether a person is likely to be happier in his or her golden years than when forming families, one would not want to set aside the fact that older people are likely to have lower income, and be less healthy, and are more likely to be living alone”. Nonetheless, no matter how interesting it might be to examine how life satisfaction changes throughout the lifespan, doing so allows no conclusions to be drawn about the effect of age alone (see also Glenn, 2009 and Blanchflower and Oswald, 2009).

In general, it is difficult to say with certainty whether the relationship between age and well-being across the lifespan is linear or convex. Given that theory and empirics in all disciplines seem to argue against an inverted U-shaped relation, the concavity hypothesis can most likely be dismissed. In fact, van Landeghem (2012) specifically concluded that, at least for Germany, “one can exclude the concavely upward sloping pattern” (p. 579), and even Easterlin (2006b), who presented the strongest evidence in favour of an inverse U-relation, admitted that “happiness is greatest at midlife, but not by a great deal” (p. 471). However, in general, one must stress that the functional relationships identified in the empirical studies are *prima facie* incompatible. In a recent study, Frijters and Beatton (2012) shed some light on this issue by analysing different functional forms with data from three large panel data sets from Germany, Australia and Britain (namely with data from the GSOEP, HILDA and BHPS). The study shows that the age-happiness profile is U-shaped when including socio-

economic control variables, but that this relationship disappears when using fixed-effects methods that also control for unobserved individual characteristics, a result also observed in Gwozdz and Sousa-Poza (2010) and Kassenboehmer and Haisken-DeNew (2012). The authors argue that this is due to reverse causality, i.e. “happiness-increasing variables, like getting a job, a high income, and getting married, appear to happen mostly to middle-aged individuals who were already happy. In all three data sets, this reverse causality shows up in cross-sections as inflated coefficients for income, marriage, and getting a job. In order to fit the actual age profile of happiness, the bias in coefficients for socio-economic variables forces the predicted age profile to become U-shaped. When one controls for fixed-effects, the non-linearity all but disappears for all three data sets” (Frijters and Beatton, 2012, p. 540).

But it is not only the choice of control variables and estimation techniques that matter – the different measures of subjective well-being also play a role. This is quite clearly shown in the Stone et al. (2010) study that reveals different patterns depending on whether a global measure of well-being, a positive hedonic well-being measure or a negative hedonic well-being measure (such as “worry” or “sadness”) is used. Recent use of more “objective” measures of subjective well-being, such as use of antidepressants (Blanchflower and Oswald, 2011) or reports of apes’ well-being by their keepers (Weiss et al., 2012), tend to support the U-shape.

Besides being statistically significant, is any observed U-shape also relevant? Or in other words, how large is the age effect? Typically, the maximum variation in life satisfaction (i.e. the difference in life satisfaction between the young and the middle-aged) is about 0.5 on a 7-point scale. One could thus conclude that the age effect on subjective well-being is rather small. It should, however, be noted that the standard error of life satisfaction is also usually not large, and that the difference in well-being between the top and bottom of the curve is about one fifth to one third of the standard deviation of life satisfaction scores. The magnitude of the age effect is comparable with medium-term effects of major life events such as becoming unemployed or becoming disabled. This magnitude, as pointed out by Blanchflower and Oswald (2008, p. 1741), “is suggestive of a large effect on well-being.”



Our survey of the literature shows that, despite the numerous recent papers published on this topic, controversy regarding the effect that ageing has on life satisfaction still exists. We believe that a fruitful avenue for future research is to focus on less subjective measures of well-being in order to see how these measures corroborate those using more traditional well-being measures. Studies such as Weiss et al. (2012) have the potential to significantly increase our understanding of this topic. Use of longer panels may also shed additional insights, as mentioned by Frijters and Beaton (2012, p. 529), who said that ideally one would want to “follow representative individuals throughout their whole life, starting at birth.” Such data is not readily available, but do exist (such as the British National Child Development Study and the British Cohort Study). We also believe that the domain approach taken by, for example, McAdams et al. (2012), can shed more light on explaining age-satisfaction trajectories, and we are not aware of many studies that take such an approach. In general, little empirical evidence exists that actually tests individual theories, implying that explanations of age-satisfaction trajectories remain somewhat speculative. Finally, a focus on countries outside of Europe and North America could also be valuable in assessing the extent to which results can be generalized. This point applies in particular to studies based on panel data, for which little evidence outside of Europe or the United States exists.

## 4 References

- Argyle, M. *The psychology of happiness*. London: Routledge, 2001.
- Baltes, P.B. and M.M. Baltes. "Psychological Perspectives on Successful Aging: The Model of Selective Optimization with Compensation". In *Successful Aging: Perspectives from the Behavioral Sciences*. P. B. Baltes and M. M. Baltes (Eds.). Cambridge, U.K.: Cambridge University Press, 1990: 1–34.
- Baltes, M.M. and J. Smith. "New Frontiers in the Future of Aging: From Successful Aging of the Young Old to the Dilemma of the Fourth Age". *Gerontology*, 2003: 123–135.
- Beauchamp, J, D. Cesarini, M. Johannesson, M. J. H. M. van der Loos, P. D. Koellinger, P. J. F. Groenen, J. H. Fowler, J. N. Rosenquist, A. Roy Thurik, and N. A. Christakis. "Molecular genetics and economics". *Journal of Economic Perspectives*, 2011: 57-82.
- Berg, A., L. Hassing, G. Mcclearn and B. Johansson. "What matters for life satisfaction in the oldest old?" *Ageing and Mental Health*, 2006: 257-264.
- Blanchflower, D. and A. Oswald. "Is well-being U-shaped over the life cycle?" *Social Science & Medicine*, 2008: 1733-1749.
- Blanchflower, D. and A. Oswald. "The U-shape without controls: A response to Glenn". *Social Science & Medicine*, 2009: 486-488.
- Blanchflower, D. and A. Oswald. "Antidepressants and Age" *IZA Discussion Paper No. 5785*, 2011.
- Brickman, P., D. Coates and R. Janoff Bulmann. "Lottery winners and accident victims: is happiness relative?" *Journal of Personality and Social Psychology*, 1978: 17-27.
- Carmel, S. "The will to live: gender differences among elderly persons". *Social Science & Medicine*, 2001: 949-958.
- Carmel, S. "The will to live as an indicator of well-being and predictor of survival in old age". Unpublished manuscript, 2011.
- Campbell, A., P. Converse and W. Rodgers. *The quality of American life: perceptions, evaluations, and satisfactions*. New York: Russell Sage Foundation, 1976.

- Charles, S. and L. Carstensen. "Socioemotional selectivity theory". In *Encyclopedia of human relationships*, H. Reis and S. Sprecher (Eds.), 1578-1581. Thousand Oaks: Sage Publications, 2009.
- Clark, A. "Born to be mild? Cohort effects don't (fully) explain why well-being is U shaped in age". IZA Discussion Paper No. 3170, 2007, 1-29.
- Clark, A. and A. Oswald. "Unhappiness and unemployment". *Economic Journal*, 1994: 648-659.
- Clark, A. and A. Oswald. "The curved relationship between subjective well-being and age". Paris-Jourdan Sciences Economiques Working Paper No. 2006, 29.
- Clark, A., Y. Georgellis, R. Lucas and E. Diener. "Unemployment alters the set point for life satisfaction". *Psychological Science*, 2004: 8-13.
- Costa, P., A. Zonderman, R. McCrae, J. Cornoni Huntley, B. Locke and H. Barبانo. "Longitudinal analyses of psychological well-being in a national sample: stability of mean levels". *Journal of Gerontology*, 1987: 50-55.
- Costa, P. and R. McCrae. "Influences of extraversion and neuroticism on subjective well-being". *Journal of Personality and Social Psychology*, 1980: 668-678.
- De Neve, J., N. Christakis, J. Fowler and B. Frey. "Genes, economics, and happiness". Institute for Empirical Research in Economics (University of Zurich) Working Paper No. 475, 2010: 1-46.
- Deaton, A. "Income, aging, health and well-being around the world: evidence from the Gallup World Poll". NBER Working Paper No. 13317, 2007.
- Deaton, A. "Income, health, and well-being around the world: evidence from the Gallup World Poll". *Journal of Economic Perspectives*, 2008: 1-20.
- Di Tella, R., R. MacCulloch and J. Oswald. "Preferences over inflation and unemployment: evidence from surveys of happiness". *American Economic Review*, 2001: 335-341.
- Diener, E. and R. Lucas. "Personality and subjective well-being". In *Well-being: the foundations of hedonic psychology*, D. Kahneman, E. Schwarz and N. Diener (Eds.), 213-229. New York: Russell Sage, 1999.
- Diener, E., R. Emmons, R. Larsen and S. Griffin. "The Satisfaction with Life Scale". *Journal of Personality Assessment*, 1985: 71-75.
- Diener, E., E.M. Suh, R.E. Lucas, and H.L. Smith. "Subjective well-being: three decades of progress". *Psychological Bulletin*, 1999: 276-302.

- Easterlin, R. "Does economic growth improve the human lot? Some empirical evidence". In *Nations and households in economic growth*, P. David and W. Melvin (Eds.), 98-125. Palo Alto: Stanford University Press, 1974.
- Easterlin, R. "A puzzle for adaptive theory". *Journal of Economic Behavior and Organization*, 2005: 513-521.
- Easterlin, R. "Building a new better theory of well-being". In *Economics and happiness: framing the analysis*, L. Porta and P. Bruni (Eds.), 29-64. New York: Oxford University Press, 2006a.
- Easterlin, R. "Life cycle happiness and its sources: intersections of psychology, economics, and demography". *Journal of Economic Psychology*, 2006b: 463-482.
- Easterlin, R. and O. Sawangfa. "Happiness and domain satisfaction: theory and evidence". IZA Discussion Paper No. 2584, 2007: 1-35.
- The Economist, "The U-bend of life", December 16, 2010.
- Fisher, I. *The theory of interest*. New York: Macmillan, 1930.
- Freund, A.M. "Selection, Optimization, and Compensation", *Encyclopedia of Aging*, D.J. Ekerdt (Ed.). New York: Macmillan, 2002.
- Frey, B. *Happiness: a revolution in economics*. Cambridge: MIT Press, 2008.
- Frey, B., and A. Stutzer. *Happiness and economics: how the economy and institutions affect well-being*. New Jersey: Princeton University Press, 2002.
- Frijters, P. and T. Beatton. "The mystery of the U-shaped relationship between happiness and age". *Journal of Economic Behavior & Organization*, 2012: 525–542.
- Glenn, N. "Is the apparent U-shape of well-being over the life course a result of inappropriate use of control variables? A commentary on Blanchflower and Oswald". *Social Science & Medicine*, 2009: 481-485.
- Gwozdz, W. and A. Sousa-Poza. "Ageing, health and life satisfaction for the oldest old: an analysis for Germany". *Social Indicators Research*, 2010: 397-417.
- Headey, B.W. "Life goals matter to happiness: A revision of set-point theory". *Social Indicators Research*, 2008: 313-331.
- Headey, B.W. and A. Wearing. "Personality, life events, and subjective well-being: Toward a dynamic equilibrium model". *Journal of Personality and Social Psychology*, 1989: 731-739.

- Huppert, F. "Positive mental health in individuals and populations". In *The science of well-being*, F. Huppert, N. Baylis and V. Keverne (eds.), 307-340. Oxford: Oxford University Press, 2005.
- Kahneman, D. "Objective happiness". In *Well-being: the foundations of hedonic psychology*, D. Kahneman, E. Diener and N. Schwarz (eds), 3-25. New York: Russell Sage Foundation, 1999.
- Kassenboehmer, S.C. and J.P. Haisken-DeNew. "Heresy or enlightenment? The well-being age U-shape effect is flat". *Economics Letters*, 2012: 235–238.
- Lang, I.A., D.J. Llewellyn, R.E. Hubbard, K.M. Langa and D. Melzer. "Income and the midlife peak in common mental disorder prevalence". *Psychological Medicine*, 2011: 1365-1372.
- Lucas, R. "Adaptation and the set point model of subjective well-being". *Current Directions in Psychological Science*, 2007: 75-79.
- Lykken, A. *Happiness: the nature and nurture of joy and contentment*. New York: St. Martin Press, 2000.
- Lykken, D., and A. Tellegen. "Happiness is a stochastic phenomenon". *Psychological Science*, 1996: 473-485.
- Marshall, A. *Principles of economics*. New York: Prometheus Books, 1997.
- McAdams, K.K., R.E. Lucas and M.B. Donnellan. "The role of domain satisfaction in explaining the paradoxical association between life satisfaction and age". *Social Indicators Research*, 2012: 295-303.
- Mroczek, D. K., and C.M. Kolarz. "The effect of age on positive and negative affect: a developmental perspective on happiness". *Journal of Personality and Social Psychology*, 1998: 1333-1349.
- Mroczek, D. and A. Spiro. "Change in life satisfaction during adulthood: findings from the Veterans Affairs Normative Aging Study". *Journal of Personality and Social Psychology*, 2005: 189-202.
- Modigliani, F. and F. Brumberg. "Utility analysis and the consumption function: an interpretation of cross-section data". In *Post-Keynesian economics*, K. Kurihara (ed.), New Brunswick: Rutgers University Press, 1954.
- Munsey, C. "Accentuating the positive - why older people are happier". *Monitor on Psychology*, 2007: 17.
- Myers, D. and E. Diener. "The pursuit of happiness". *Scientific American*, 1996: 54-56.

- Myers, D. and E. Diener. "Who is happy?" *Psychological Science*, 1995: 10-17.
- Oswald, A. "Happiness and economic performance". *Economic Journal*, 1997: 1-30.
- Schilling, O. "Cohort- and age-related decline in elder's life satisfaction: is there really a paradox?" *European Journal of Ageing*, 2005: 254-263.
- Stiglitz, J., A. Sen and J. P. Fitoussi. *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Paris: Commission on the Measurement of Economic Performance and Social Progress, 2009.
- Stone, A.A., J.E. Schwartz, J.E. Broderick, and A. Deaton. "A snapshot of the age distribution of psychological well-being in the United States". *Proceedings of the National Academy of Sciences*, 2010: 9985-9990.
- Van Landeghem, B. "A test for convexity of human well-being over the lifecycle: longitudinal evidence from a 20-year panel". *Journal of Economic Behavior and Organization*, 2012: 571-585.
- Van Landeghem, B. "Human well-being over the life cycle: longitudinal evidence from a 20-year panel". LICOS Discussion Paper No. 213/2008, Katholieke Universiteit Leuven, 2008.
- Walker, A. "A European perspective on quality of life in old age". *European Journal of Ageing*, 2005: 2-12.
- Weiss, A., J.E. King, M. Inoue-Murayama, T. Matsuzawa, and A.J. Oswald. "Evidence for a 'Midlife Crisis' in Great Apes Consistent with the U-Shape in Human Well-Being". *Proceedings of the National Academy of Sciences*, 2012: 19949-19952.
- Williams, A. "Measuring the quality of life of the elderly". In *Public economics and the quality of life*, A. Wingo and L. Evans (eds), 282-297. Baltimore: The John Hopkins University Press, 1977.
- Winter, L., M.P. Lawton, R.J. Casten and R.L. Sando. "The relationship between external events and affect states in older people". *International Journal of Human Development and Aging*, 1999: 1-12.

## 5 Appendix

Study	Data	Cross-sectional (CS) / longitudinal (L)	Controls	Selected highlights
<i>Literature surveys</i>				
Myers and Diener 1996				No time in life is notably happiest or most satisfying. Happiness does not appear to depend significantly on outside circumstances.
Frey and Stutzer 2002				Age affects happiness in a U-shaped way. Young and old people are happier than middle-aged people. The least happy people are between 30 and 35 years old.
<i>Studies with evidence for U-shape</i>				
Clark and Oswald 1994, 2006	British Household Panel Survey and General Health Questionnaire	L	YES	Clear evidence of a U-shape. Minimum life satisfaction reached in the band between 40 to 49 years.

Clark 2007	British Household Panel Survey	L	YES	Confirms U-shaped relation after controlling for cohort effects.
Blanchflower and Oswald 2008	US General Social Surveys, Eurobarometer, UK Labour Force Survey, World Values Survey, Latinobarometer, Asiabarometer	CS	YES	Well defined U-shape in age. Well-being in the U.S. reaches its minimum for men in the early 50s, for women in the late 30s. In Europe, life satisfaction for both men and women minimises in the mid 40s.
Van Landegham 2008, 2012	German Socio-Economic Panel 1985-2007	L	YES	U-shape in age. Minimum life satisfaction between 42 and 52 years. U-shape vanishes after controlling for individuals fixed effects.
Blanchflower and Oswald 2011	Eurobarometer 2010	CS	YES	Inverted U-shape relation between the probability of taking antidepressants and age.
Lang et al. 2011	Health Survey for England 1997-2006	CS	YES	Prevalence of psychological distress, diagnoses and treatments rise with age until early middle age and then declined subsequently in low- income groups.
McAdams et al. 2012	British Household Panel 1996-2000 and 2002-2004	L	NO	Analyses eight individual domains of life satisfaction. Age trajectories diverge considerably across these domains. When aggregating all eight domains, a pattern resembling the U-shape of overall life satisfaction emerges.



Weiss et al. 2012	Sample of caretakers' evaluation of great apes' well-being in 4 countries	CS	NO	U-shape relation between well-being and age can be observed.
<i>Studies with evidence for linear relation or inverted U-shape</i>				
Costa et al. 1987	National Health and Nutrition Examination Survey	L	YES	Total well-being shows no significant age, birth cohort or time effects in any of the analyses. Strong evidence of the stability of mean levels of psychological well-being in adulthood.
Mroczek and Spiro 2005	Veterans Affairs Normative Aging Study	L	YES	Inverted U-shaped relation between age in life satisfaction. Life satisfaction peaks around 65 years. One year before death, life satisfaction dramatically decreases.
Easterlin 2006b	US General Social Surveys 1973–1994	L	YES	Happiness increases in midlife, but “not by a great deal”. Highest life satisfaction at age 51.
Easterlin and Sawangfa 2007	US General Social Surveys 1973–1994	L	YES	Shows an inverted U-shape. Effect of age on individual domains of life satisfaction are analysed.

Deaton 2007	2006 World Gallup Poll (132 countries)	CS	NO	Age-profile of life satisfaction differs among countries. There seems to be a U-shaped relation only among rich English-speaking countries.
Gwozdz and Sousa-Poza 2010	German Socio-Economic Panel 1994–2006	L	YES	Estimating pooled regressions, most age dummies are significant and produce a U-shape. Using fixed effects estimation, the U-shape vanishes. Strong decline in satisfaction among the oldest old.
Stone et al. 2010	Gallup Poll 2008	CS	YES	Although global as well as positive hedonic well-being is U-shaped, negative hedonic well-being is not. Feelings of stress and anger decline with age, feelings of worry are elevated through middle age and then decline, and feelings of sadness are in essence flat.
Carmel 2011	Four data sets on elderly Israelis	CS	YES	Willingness to live can be used as a proxy for life satisfaction. Willingness to live declines with age.
Kassenboehmer and Haisken-DeNew 2012	German Socio-Economic Panel 1994–2006	L	YES	The U-shape effect on life satisfaction in pooled OLS regressions is refuted when controlling for fixed effects and respondent experience in the panel.

Frijters and Beaton 2012	German Socio-Economic Panel, British Household Panel Survey, Household Income Labour Dynamics Australia.	L	YES	<p>The weak U-shape in middle age becomes more pronounced when allowing for socio-economic variables.</p> <p>When selection effects via fixed-effects are accounted for, the dominant age-effect in all three panels is a strong happiness increase around the age of 60 followed by a major decline after 75, with the U-shape in middle age disappearing.</p>
-----------------------------	--	---	-----	---

## FZID Discussion Papers

### Competence Centers:

IK:	Innovation and Knowledge
ICT:	Information Systems and Communication Systems
CRFM:	Corporate Finance and Risk Management
HCM:	Health Care Management
CM:	Communication Management
MM:	Marketing Management
ECO:	Economics

Download FZID Discussion Papers from our homepage: <https://fzid.uni-hohenheim.de/71978.html>

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
01-2009	Julian P. Christ	NEW ECONOMIC GEOGRAPHY RELOADED: Localized Knowledge Spillovers and the Geography of Innovation	IK
02-2009	André P. Slowak	MARKET FIELD STRUCTURE & DYNAMICS IN INDUSTRIAL AUTOMATION	IK
03-2009	Pier Paolo Saviotti and Andreas Pyka	GENERALIZED BARRIERS TO ENTRY AND ECONOMIC DEVELOPMENT	IK
04-2009	Uwe Focht, Andreas Richter, and Jörg Schiller	INTERMEDIATION AND MATCHING IN INSURANCE MARKETS	HCM
05-2009	Julian P. Christ and André P. Slowak	WHY BLU-RAY VS. HD-DVD IS NOT VHS VS. BETAMAX: THE CO-EVOLUTION OF STANDARD-SETTING CONSORTIA	IK
06-2009	Gabriel Felbermayr, Mario Larch, and Wolfgang Lechthaler	UNEMPLOYMENT IN AN INTERDEPENDENT WORLD	ECO
07-2009	Steffen Otterbach	MISMATCHES BETWEEN ACTUAL AND PREFERRED WORK TIME: Empirical Evidence of Hours Constraints in 21 Countries	HCM
08-2009	Sven Wydra	PRODUCTION AND EMPLOYMENT IMPACTS OF NEW TECHNOLOGIES – ANALYSIS FOR BIOTECHNOLOGY	IK
09-2009	Ralf Richter and Jochen Streb	CATCHING-UP AND FALLING BEHIND KNOWLEDGE SPILLOVER FROM AMERICAN TO GERMAN MACHINE TOOL MAKERS	IK

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
10-2010	Rahel Aichele and Gabriel Felbermayr	KYOTO AND THE CARBON CONTENT OF TRADE	ECO
11-2010	David E. Bloom and Alfonso Sousa-Poza	ECONOMIC CONSEQUENCES OF LOW FERTILITY IN EUROPE	HCM
12-2010	Michael Ahlheim and Oliver Frör	DRINKING AND PROTECTING – A MARKET APPROACH TO THE PRESERVATION OF CORK OAK LANDSCAPES	ECO
13-2010	Michael Ahlheim, Oliver Frör, Antonia Heinke, Nguyen Minh Duc, and Pham Van Dinh	LABOUR AS A UTILITY MEASURE IN CONTINGENT VALUATION STUDIES – HOW GOOD IS IT REALLY?	ECO
14-2010	Julian P. Christ	THE GEOGRAPHY AND CO-LOCATION OF EUROPEAN TECHNOLOGY-SPECIFIC CO-INVENTORSHIP NETWORKS	IK
15-2010	Harald Degner	WINDOWS OF TECHNOLOGICAL OPPORTUNITY DO TECHNOLOGICAL BOOMS INFLUENCE THE RELATIONSHIP BETWEEN FIRM SIZE AND INNOVATIVENESS?	IK
16-2010	Tobias A. Jopp	THE WELFARE STATE EVOLVES: GERMAN KNAPPSCHAFTEN, 1854-1923	HCM
17-2010	Stefan Kirn (Ed.)	PROCESS OF CHANGE IN ORGANISATIONS THROUGH eHEALTH	ICT
18-2010	Jörg Schiller	ÖKONOMISCHE ASPEKTE DER ENTLOHNUNG UND REGULIERUNG UNABHÄNGIGER VERSICHERUNGSVERMITTLER	HCM
19-2010	Frauke Lammers and Jörg Schiller	CONTRACT DESIGN AND INSURANCE FRAUD: AN EXPERIMENTAL INVESTIGATION	HCM
20-2010	Martyna Marczak and Thomas Beissinger	REAL WAGES AND THE BUSINESS CYCLE IN GERMANY	ECO
21-2010	Harald Degner and Jochen Streb	FOREIGN PATENTING IN GERMANY, 1877-1932	IK
22-2010	Heiko Stüber and Thomas Beissinger	DOES DOWNWARD NOMINAL WAGE RIGIDITY DAMPEN WAGE INCREASES?	ECO
23-2010	Mark Spoerer and Jochen Streb	GUNS AND BUTTER – BUT NO MARGARINE: THE IMPACT OF NAZI ECONOMIC POLICIES ON GERMAN FOOD CONSUMPTION, 1933-38	ECO

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
24-2011	Dhammika Dharmapala and Nadine Riedel	EARNINGS SHOCKS AND TAX-MOTIVATED INCOME-SHIFTING: EVIDENCE FROM EUROPEAN MULTINATIONALS	ECO
25-2011	Michael Schuele and Stefan Kirn	QUALITATIVES, RÄUMLICHES SCHLIEßEN ZUR KOLLISIONSERKENNUNG UND KOLLISIONSVERMEIDUNG AUTONOMER BDI-AGENTEN	ICT
26-2011	Marcus Müller, Guillaume Stern, Ansgar Jacob and Stefan Kirn	VERHALTENSMODELLE FÜR SOFTWAREAGENTEN IM PUBLIC GOODS GAME	ICT
27-2011	Monnet Benoit Patrick Gbakoua and Alfonso Sousa-Poza	ENGEL CURVES, SPATIAL VARIATION IN PRICES AND DEMAND FOR COMMODITIES IN CÔTE D'IVOIRE	ECO
28-2011	Nadine Riedel and Hannah Schildberg-Hörisch	ASYMMETRIC OBLIGATIONS	ECO
29-2011	Nicole Waidlein	CAUSES OF PERSISTENT PRODUCTIVITY DIFFERENCES IN THE WEST GERMAN STATES IN THE PERIOD FROM 1950 TO 1990	IK
30-2011	Dominik Hartmann and Atilio Arata	MEASURING SOCIAL CAPITAL AND INNOVATION IN POOR AGRICULTURAL COMMUNITIES. THE CASE OF CHÁPARRA - PERU	IK
31-2011	Peter Spahn	DIE WÄHRUNGSKRISEUNION DIE EURO-VERSCHULDUNG DER NATIONALSTAATEN ALS SCHWACHSTELLE DER EWU	ECO
32-2011	Fabian Wahl	DIE ENTWICKLUNG DES LEBENSSTANDARDS IM DRITTEN REICH – EINE GLÜCKSÖKONOMISCHE PERSPEKTIVE	ECO
33-2011	Giorgio Triulzi, Ramon Scholz and Andreas Pyka	R&D AND KNOWLEDGE DYNAMICS IN UNIVERSITY-INDUSTRY RELATIONSHIPS IN BIOTECH AND PHARMACEUTICALS: AN AGENT-BASED MODEL	IK
34-2011	Claus D. Müller-Hengstenberg and Stefan Kirn	ANWENDUNG DES ÖFFENTLICHEN VERGABERECHTS AUF MODERNE IT SOFTWAREENTWICKLUNGSVERFAHREN	ICT
35-2011	Andreas Pyka	AVOIDING EVOLUTIONARY INEFFICIENCIES IN INNOVATION NETWORKS	IK
36-2011	David Bell, Steffen Otterbach and Alfonso Sousa-Poza	WORK HOURS CONSTRAINTS AND HEALTH	HCM
37-2011	Lukas Scheffknecht and Felix Geiger	A BEHAVIORAL MACROECONOMIC MODEL WITH ENDOGENOUS BOOM-BUST CYCLES AND LEVERAGE DYNAMICS	ECO
38-2011	Yin Krogmann and Ulrich Schwalbe	INTER-FIRM R&D NETWORKS IN THE GLOBAL PHARMACEUTICAL BIOTECHNOLOGY INDUSTRY DURING 1985–1998: A CONCEPTUAL AND EMPIRICAL ANALYSIS	IK

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
39-2011	Michael Ahlheim, Tobias Börger and Oliver Frör	RESPONDENT INCENTIVES IN CONTINGENT VALUATION: THE ROLE OF RECIPROCITY	ECO
40-2011	Tobias Börger	A DIRECT TEST OF SOCIALLY DESIRABLE RESPONDING IN CONTINGENT VALUATION INTERVIEWS	ECO
41-2011	Ralf Rukwid and Julian P. Christ	QUANTITATIVE CLUSTERIDENTIFIKATION AUF EBENE DER DEUTSCHEN STADT- UND LANDKREISE (1999-2008)	IK

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
42-2012	Benjamin Schön and Andreas Pyka	A TAXONOMY OF INNOVATION NETWORKS	IK
43-2012	Dirk Foremny and Nadine Riedel	BUSINESS TAXES AND THE ELECTORAL CYCLE	ECO
44-2012	Gisela Di Meglio, Andreas Pyka and Luis Rubalcaba	VARIETIES OF SERVICE ECONOMIES IN EUROPE	IK
45-2012	Ralf Rukwid and Julian P. Christ	INNOVATIONSPOTENTIALE IN BADEN-WÜRTTEMBERG: PRODUKTIONSCLUSTER IM BEREICH „METALL, ELEKTRO, IKT“ UND REGIONALE VERFÜGBARKEIT AKADEMISCHER FACHKRÄFTE IN DEN MINT-FÄCHERN	IK
46-2012	Julian P. Christ and Ralf Rukwid	INNOVATIONSPOTENTIALE IN BADEN-WÜRTTEMBERG: BRANCHENSPEZIFISCHE FORSCHUNGS- UND ENTWICKLUNGSAKTIVITÄT, REGIONALES PATENTAUFKOMMEN UND BESCHÄFTIGUNGSSTRUKTUR	IK
47-2012	Oliver Sauter	ASSESSING UNCERTAINTY IN EUROPE AND THE US - IS THERE A COMMON FACTOR?	ECO
48-2012	Dominik Hartmann	SEN MEETS SCHUMPETER. INTRODUCING STRUCTURAL AND DYNAMIC ELEMENTS INTO THE HUMAN CAPABILITY APPROACH	IK
49-2012	Harold Paredes- Frigolett and Andreas Pyka	DISTAL EMBEDDING AS A TECHNOLOGY INNOVATION NETWORK FORMATION STRATEGY	IK
50-2012	Martyna Marczak and Víctor Gómez	CYCLICALITY OF REAL WAGES IN THE USA AND GERMANY: NEW INSIGHTS FROM WAVELET ANALYSIS	ECO
51-2012	André P. Slowak	DIE DURCHSETZUNG VON SCHNITTSTELLEN IN DER STANDARDSETZUNG: FALLBEISPIEL LADESYSTEM ELEKTROMOBILITÄT	IK
52-2012	Fabian Wahl	WHY IT MATTERS WHAT PEOPLE THINK - BELIEFS, LEGAL ORIGINS AND THE DEEP ROOTS OF TRUST	ECO
53-2012	Dominik Hartmann und Micha Kaiser	STATISTISCHER ÜBERBLICK DER TÜRKISCHEN MIGRATION IN BADEN-WÜRTTEMBERG UND DEUTSCHLAND	IK
54-2012	Dominik Hartmann, Andreas Pyka, Seda Aydin, Lena Klauß, Fabian Stahl, Ali Santircioglu, Silvia Oberegelsbacher, Sheida Rashidi, Gaye Onan und Suna Erginkoç	IDENTIFIZIERUNG UND ANALYSE DEUTSCH-TÜRKISCHER INNOVATIONSNETZWERKE. ERSTE ERGEBNISSE DES TGIN- PROJEKTES	IK
55-2012	Michael Ahlheim, Tobias Börger and Oliver Frör	THE ECOLOGICAL PRICE OF GETTING RICH IN A GREEN DESERT: A CONTINGENT VALUATION STUDY IN RURAL SOUTHWEST CHINA	ECO



<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
56-2012	Matthias Strifler Thomas Beissinger	FAIRNESS CONSIDERATIONS IN LABOR UNION WAGE SETTING – A THEORETICAL ANALYSIS	ECO
57-2012	Peter Spahn	INTEGRATION DURCH WÄHRUNGSUNION? DER FALL DER EURO-ZONE	ECO
58-2012	Sibylle H. Lehmann	TAKING FIRMS TO THE STOCK MARKET: IPOS AND THE IMPORTANCE OF LARGE BANKS IN IMPERIAL GERMANY 1896-1913	ECO
59-2012	Sibylle H. Lehmann, Philipp Hauber, Alexander Opitz	POLITICAL RIGHTS, TAXATION, AND FIRM VALUATION – EVIDENCE FROM SAXONY AROUND 1900	ECO
60-2012	Martyna Marczak and Víctor Gómez	SPECTRAN, A SET OF MATLAB PROGRAMS FOR SPECTRAL ANALYSIS	ECO
61-2012	Theresa Lohse and Nadine Riedel	THE IMPACT OF TRANSFER PRICING REGULATIONS ON PROFIT SHIFTING WITHIN EUROPEAN MULTINATIONALS	ECO

<b>Nr.</b>	<b>Autor</b>	<b>Titel</b>	<b>CC</b>
62-2013	Heiko Stüber	REAL WAGE CYCLICALITY OF NEWLY HIRED WORKERS	ECO
63-2013	David E. Bloom and Alfonso Sousa-Poza	AGEING AND PRODUCTIVITY	HCM
64-2013	Martyna Marczak and Víctor Gómez	MONTHLY US BUSINESS CYCLE INDICATORS: A NEW MULTIVARIATE APPROACH BASED ON A BAND-PASS FILTER	ECO
65-2013	Dominik Hartmann and Andreas Pyka	INNOVATION, ECONOMIC DIVERSIFICATION AND HUMAN DEVELOPMENT	IK
66-2013	Christof Ernst, Katharina Richter and Nadine Riedel	CORPORATE TAXATION AND THE QUALITY OF RESEARCH AND DEVELOPMENT	ECO
67-2013	Michael Ahlheim, Oliver Frör, Jiang Tong, Luo Jing and Sonna Pelz	NONUSE VALUES OF CLIMATE POLICY - AN EMPIRICAL STUDY IN XINJIANG AND BEIJING	ECO
68-2013	Michael Ahlheim and Friedrich Schneider	CONSIDERING HOUSEHOLD SIZE IN CONTINGENT VALUATION STUDIES	ECO
69-2013	Fabio Bertoni and Tereza Tykvová	WHICH FORM OF VENTURE CAPITAL IS MOST SUPPORTIVE OF INNOVATION? EVIDENCE FROM EUROPEAN BIOTECHNOLOGY COMPANIES	CFRM
70-2013	Tobias Buchmann and Andreas Pyka	THE EVOLUTION OF INNOVATION NETWORKS: THE CASE OF A GERMAN AUTOMOTIVE NETWORK	IK
71-2013	B. Vermeulen, A. Pyka, J. A. La Poutré, A. G. de Kok	CAPABILITY-BASED GOVERNANCE PATTERNS OVER THE PRODUCT LIFE-CYCLE	IK
72-2013	Beatriz Fabiola López Ulloa, Valerie Møller, Alfonso Sousa-Poza	HOW DOES SUBJECTIVE WELL-BEING EVOLVE WITH AGE? A LITERATURE REVIEW	HCM



FORSCHUNGSZENTRUM FZID

Universität Hohenheim  
Forschungszentrum  
Innovation und Dienstleistung  
Fruwirthstr. 12

D-70593 Stuttgart

Phone +49 (0)711 / 459-22476

Fax +49 (0)711 / 459-23360

Internet [www.fzid.uni-hohenheim.de](http://www.fzid.uni-hohenheim.de)