Essays on the Economics of Happiness

by

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À Emilie,

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CHAPTER I

Introduction

The idea that subjective well-being can serve as a measure of individual welfare has led to a revival of Bentham's conception of utility: "that property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness (...)"[1]. Some argue that subjective well-being is a better measure of utility than choices because, it measures experienced utility rather than decision utility [Daniel Kahneman and Sarin(1997)].[2] The use of subjective well-being as a proxy for utility shows great promise for economics but also raises important questions about governmental policies and individual well-being. Consequently, happiness research is becoming increasingly popular in the media.

I refer throughout to the "equivalence assumption", a term meant to capture the conceptual equivalence of well-being and utility. The methodological implication of this assumption is that self-rated survey items about peoples' hedonic states are informative of their economic welfare. Assuming reliable information implies that researchers can rely on what individuals say and not solely on what they do. This departs from the traditional methodology by which economists gather information. As many of the concepts discussed in this text appear closely related to one another, the following explains the theoretical distinctions amongst them.

Throughout this dissertation, the use of the terms happiness and life-satisfaction refers to

[1] The term *Well-Being* is used to refer to both *Happiness* and *Life Satisfaction* as measured by questionnaire items such as the ones presented later in this text.

[2] Kahneman and al. argue that there is a difference between decision utility, what drives people to make choices, and experienced utility, the actual utility attained by these choices.

"what is measured by subjective well-being survey items", as opposed to abstract philosophical concepts open to interpretation. Subjective well-being is simply a way of referring to both measures simultaneously.

Happiness can be defined as the "overall goodness or badness of an individual's felt experience at any point in time". Underlying this is the presumption that well-being is a hedonic state which results from seeking pleasure and avoiding pain. A less narrow definition of the concept refers to the fulfilment of ones human potential, also referred to as psychological well-being [Bruni and Porta()].

More specific conceptions include Kimbal and Willis's [Kimball and Willis(2005)] definition of happiness as the sum of two components: elation –or short-run happiness– and base-line mood –or long-run happiness–. High frequency measures of well-being capture the evolution of elation, the reaction to new information about life-time utility[3] [Miles Kimball and Tsutsui(2006)] . Low-frequency happiness measures reflect long-run happiness, a sub-utility function much like health, entertainment or nutrition.

Life satisfaction measures something slightly different than happiness in that it implicitly asks individuals to make comparisons. Satisfaction is by definition a relative concept. When a respondent is asked how satisfied she is with her life, she is asked to compare her circumstance with an unspecified benchmark.

Utility is the concept used in economics to represent an agent's preferences into a tractable object. It is what agents maximize when making decisions, i.e. when choosing between options. Behavioral economists sometimes draw a distinction between two types of utility. The fact that individuals often make mistakes has prompted some to argue that a distinction should be made between decision and experienced utility. "Decision utility is the weight of an outcome in a decision. Experienced utility is hedonic quality, as in Bentham's usage" [Daniel Kahneman and Sarin(1997)].

Finally, welfare is also frequently employed in the field. Its meaning is typically context de-

[3]See Kimball, Levy, Ohtake and Tsutsui for an example of the use of weekly happiness data to understand the effect of the Katrina hurricane.

pendent. In the context of standard economics, welfare simply refers to utility (generally to the utility of many agents). If one were to draw a distinction between decision and experienced utility, "welfare", as commonly used, would equate to experienced utility. In that sense, many happiness researchers equate subjective well-being with welfare and experienced utility and revealed preference with decision utility.

Even if it does not measure utility, understanding the determinants of well-being is important. Uncovering the shape of the "long-run happiness function" would inform policy makers about the demand of a good which is undoubtedly a very-important determinant of welfare.

Views on the relevance of happiness research for Economics vary a great deal. Generally speaking, most economists then to be wary of the method. Unfortunately, little research is conducted on the method *per se*; the assumption of equivalence between happiness and utility is typically either accepted or rejected but it is rarely tested. This dissertation intends to remediate this by providing grounds for a critical review of the literature in the field of happiness economics.

Chapter II, entitled "The Functional Form of Happiness", provides an empirical test of the notion that the lack of growth in aggregate happiness in the US despite a massive rise in GDP per capita can be explained by the mechanisms of income adaptation and social comparison. This interpretation of the Easterlin paradox has led some to conclude that economic growth should not be an objective of modern governments. The analysis in the chapter shows how the assumption of equivalence has led many researchers to interpret the so-called stylized facts of happiness as evidence that people perfectly adapt to income changes. More importantly, the text demonstrates that this interpretation is flawed as it is not supported by microeconomic analysis. Social comparison is also rejected as a satisfactory solution to the happiness income puzzle on the grounds that the comparisons that people make are physically close to them which, taken alone, is incompatible with the stylized fact that citizens in richer countries tend to be happier. The argumentation presented in the chapter leads to the conclusion that income inequality plays a crucial role in the conversion of economic growth into general happiness, the focus of the second chapter.

Chapter III, entitled "Happiness and Income Inequality" explores the importance of income inequality for general well-being. The chapter documents the simultaneous increase of both the

income and happiness gaps between the rich and the poor over the last three decades. The analysis shows that this pattern of economic growth with no increase in average happiness is not inconsistent with agents whose preferences are typical that they do not exhibit adaptation or social comparison. The concavity of the happiness function is crucial to the argument. The chapter also explores and rejects the possibility that the paradox is a result of a measurement error of the income variable.

Chapter IV, entitled "Time, Gender and Happiness" argues in favor of interpreting subjective well-being as a good while proposing a framework for happiness research and the interpretation of subjective well-being regressions. The paper documents the life-cycle differences in happiness measures of men and women and the importance of both time spent working and work status for individual well-being. The capacity of these gender differences to explain the absolute and relative decline of women happiness in the US is tested. The analysis reveals that while women tend to be happier than men during youth, the reverse is true after retirement. The happiness of men and women also differs with respect to the effects of time spent working and work status. One of the elements to emerge is that work status is a less important factor in a woman's happiness than a man's; an interpretation is proposed. Although the analysis finds mixed evidence that gender specific factors can explain the reversal of the gender happiness gap, the results support the notion that happiness is a good and that its production is time-intensive.

CHAPTER II

The Functional Form of Happiness

2.1 Introduction

The use of subjective well-being (SWB) as a proxy for utility has grown in popularity. This is in part due to the growing concern that revealed preferences measure decision utility rather than experienced utility. Experienced utility is the relevant concept for policy making and happiness researchers believe that subjective well-being is a better measure of it. Validating this assumption, however, is a complex task. Finding utility functions capable of mimicking the behavior of SWB and its puzzling relationship to income is crucial in demonstrating that SWB measures welfare. This is one of the reason so much attention has been given to the study of happiness functions. Many have concluded that functions that exhibit income adaptation and social comparison can solve the famous happiness income puzzle [Ed Diener and Diener(1992)], [Easterlin(2001)], [Stutzer(2004)]. In the words of Clark and Shields income adaptation and social comparisons can "easily explain the Easterlin Paradox" [Andrew E. Clark and Shields(2008)].

This paper shows that although utility functions which reconcile growing GDP with flat average happiness exist some of the preferences implied by these functions fail empirical tests at the microeconomic level. Many of the models of utility proposed in the happiness literature as solutions to the Easterlin paradox cannot replicate all of the features of the relationship between income and subjective well-being. The analysis in this paper leads to the conclusion that inferences

made from macroeconomic aggregations of subjective well-being are inconsistent with microeconomic analysis and that these so-called solutions are incomplete. Stated differently, conclusions about peoples' preferences based on interpretations of the happiness income puzzle, such as the notion that income growth does not raise individual happiness, are flawed.

Under the income adaptation conjecture, utility functions capable of converting a growing GDP into flat utility flows exhibit extremely high levels of adaptation, empirically unobserved at the microeconomic level. Under the social comparison conjecture, amongst GDP, World GDP and average regional income, the only reference group to receive empirical support is regional income. Although functions that represent the preferences of agents who compare their income with the average income in their region are capable of replicating the lack of growth in aggregate happiness, they do not explain why richer countries tend to be happier then poorer ones. Because they offer some of the best available data and both exhibit the pattern of rising GDP and non-growing well-being, the paper focuses on Germany and the United-States.

The paper is organized as follows: Section 2.2 summarizes the relevant literature and presents a description of the stylized facts of the relationship between income and well-being that form the Easterlin Paradox (2.2.1). More specifically, Section 2.2.2 describes how income adaptation (2.2.2) and social comparison (2.2.2) explain the happiness-income puzzle. Section 2.3 presents a formal model of the two mechanism. The model serves as the foundation of the empirical strategy (Section 2.4) for the analysis in Section 2.5. The data is described in Section 4.3. Section 2.6 discusses some implications and limitations of the paper and Section 2.7 concludes.

2.2 Background

The SWB method relies on an individual's capacity to assess her own feelings of happiness and satisfaction with life and builds on the assumption that subjective well-being is conceptually and empirically equivalent to utility. The consensus among happiness researchers is that "happiness scores measure true internal utility" [DiTella and MacCulloch(2006)] and that "measures of subjective well-being can (...) serve as proxies for utility" [Frey and Stutzer(2002)]. Richard East-

erlin, for example, takes "the terms well-being, utility, happiness, life satisfaction and welfare to be interchangeable" [Easterlin(2005)].

One of the appeals of the SWB approach is that it offers the possibility of exploring questions which have remained without answers due to a lack of behavioral evidence. Happiness and life-satisfaction questions have been used, among other things, to value non-traded goods [Rafeal Di Tella and MacCulloch(2004)], life events [Miles Kimball and Tsutsui(2006)] and macroeconomic circumstances [Rafael DiTella and Oswald(2001)]. Well-being research can provide policy-makers with valuable information about individual welfare, especially in the event that preferences are inconsistent or lead to sub-optimal behavior [Oswald(1997)], [Easterlin(2001)], [Frey and Stutzer(2002)], [Kimball and Willis(2005)]. However, while happiness behaves in many regards as economists would expect utility to behave, the equivalence between subjective well-being and welfare has yet to be formally established. If SWB does not measure utility, its use as a policy tool could be misguided.

2.2.1 The Easterlin Paradox

Of special interest to happiness researchers is the relationship between well-being and income. Over the last few decades, studies have uncovered a series of stylized facts that appear to be inconsistent. Succinctly put, although richer people are happier and richer countries have happier citizens, increases in average income over time do not appear to lead to corresponding increases in average happiness [Oswald(1997)], [Frey and Stutzer(2002)]. Because he was one of the first to highlight this inconsistency, these puzzling facts have taken his name and are often referred to collectively as the Easterlin paradox [Easterlin(1974)].

Irrespective of time or place, analyses of individual cross-sections systematically find that people with higher income are happier (Fact 1) [Frey and Stutzer(2002)]. Figure 2.7 plots superimposed cross sections of subjective well-being and real income for the US and Germany, with data aggregated by income group.[1] This relationship between well-being and income is concave and the log-linear function appropriately capture its degree of curvature [Rousseau(2009)].

[1]The income group are the income category in the questionnaire for the GSS and groups of 5 percentile for the GSOEP.

A similar finding is that on average richer nations have happier citizens (Fact 2). Figure 2.2 plots the income and standardized levels of happiness for different countries that took part in the fourth wave of the World Values Survey. The nature of the relationship between income and individual well-being is somewhat different than the relationship between GDP and national well-being. The former is more concave than the latter as the trend lines on the graphic suggest.

What is puzzling about the relationship between income and well-being comes from the fact that although they are positively related to one another in the cross-section, in many countries, there is no significant increase in average well-being despite substantial increases in average real income (Fact 3). Figure 2.3 plots the time series of average subjective well-being for the US and Germany against real GDP per capita. The scales have been chosen to highlight two misconceptions about well-being across time. Firstly, although it is often said that happiness is "flat", aggregate well-being is not stagnant over time; it is a rather volatile flow. Secondly, the most accurate description of the time trend of aggregate well-being is that there is nothing stylized about it. In some countries, such as Germany, the available data suggests not only a lack of growth but a real decline.[2] Stevenson and Wolfers observed that the lack of growth in average well-being is not present in every country. In some nations such as Italy or Denmark (as identified in the Eurobarometer), economic growth has been accompanied with a rise in average subjective well-being [Stevenson and Wolfers(2008a)].

In another paper, I document the widening of the happiness gap between the richest and poorest quintile in developed countries, where average income has grown in the last half of the twentieth century [Rousseau(2009)]. The top two graphics of Figure 2.4 plot the evolution of average subjective well-being of income quitiles in the US and Germany. The middle graphics highlight the evolution of the rich-poor happiness gap (black dashed line), while the bottom graphics plot the evolution of real income for these groups. In the US, for example, the happiness difference between the bottom 20% poorest and the top 20% richest is 25% larger in 2003 then it was in 1975. Since this phenomena qualifies the evolution of happiness across the income distribution it should

[2] A linear regression of life satisfaction on time estimates a decline of roughly 0.4 of a standard deviation between 1984 and 2004.

be considered a stylized feature of the relationship between income and happiness.[3]

Stylized Facts

Fact 1 Log-linear relation between individual income and subjective well-being

Fact 2 Positive relationship between national SWB and GDP per capita

Fact 3 Negative/Flat/Positive relationship between economic growth and national SWB

Fact 4 Widening of the rich-poor happiness gap in economically developed countries

Regardless of whether the lack of evidence of serial correlation between income and happiness has been incorrectly interpreted as a lack of correlation (as Stevenson and Wolfers have suggested [Stevenson and Wolfers(2008a)]), many have interpreted the puzzle as evidence that conventional conceptions of utility functions need to be revisited. The most commonly proposed modification is the inclusion of the income adaptation and social comparison mechanisms. The insights behind these two phenomena stem from research showing that individual happiness is negatively affected by past own income and neighbor's current income [Rafeal Di Tella and MacCulloch(2004)] [Luttmer(2004)]. If they truly are "solutions" to the Easterlin paradox, happiness functions of adaptation and comparison should be able to replicate all of the stylized facts enumerated above. The aim of this paper is to test whether this is indeed the case.

2.2.2 Interpreting the Easterlin Paradox

Many interpretations have been given to the inconsistent stylized facts about the relationship between income and happiness. Aside from the income adaptation and social comparison solutions, researchers have explored the possibility that survey items improperly measure SWB, that SWB measures something other than contemporaneous utility, and that variables have been omitted from the analysis.

One possible explanation is that surveys do not accurately measure happiness, and consequently utility. This explanation is typically rejected on the grounds that happiness items are cor-

[3]These estimates are obtained with an ordered probit of happiness on a set of binary variables of membership to the bottom, mid and top quintiles and interaction of these variables with time as well as sociodemographic controls.

related with other indicators of mood, such as the frequency at which individuals smile and frown, the assessment of individual's emotional state by external judges and frontal brain activity [Shizgal(2000)] [Diener and Lucas(1999)] [Fox and Davidson(1988)]. In the language of psychologists, subjective well-being measures are internally valid.

Another possible reason for the lack of serial correlation between individual happiness and income is that happiness measures life-time utility rather than contemporaneous utility. Since life-time utility is forward looking, expected income changes are accounted for in advance. If happiness measured life-time utility, it would only fluctuate with unexpected changes in circumstances and therefore would exhibit no positive time trend in the absence of such changes. Under this conjecture, richer individuals would be happier because their expected income is higher. This assumption, however, must be rejected because it fails to explain the lack of a positive time trend at the national level, which is observed in some countries. Indeed, if happiness measured life-time utility, average happiness would have reflected the growth in average life-time income in the US over the last decades. [4]

Researchers have also considered the possibility that the Paradox stems from the omission of key determinants of well-being from empirical studies. Although little work has been done to test this hypothesis, the idea is generally rejected on the grounds that consumption goods, healthcare and living conditions in general, things that are presumed to be important for happiness, have improved over the last century [DiTella and MacCulloch(2005)]. More recently, researchers have begun to investigate the role of "social capital" variables, such as trust and the quality of government. Although it is not the focus of this paper, it appears that accounting for these factors could shed new light on the Easterlin paradox [Helliwell and Putnam(2004)], [Helliwell and Huang(2005)], [S. Bartolini and Pugno(2007)], [Biancotti and D'Alessio(2007)].

Another explanation that has been presented is the that people do not spend their money on what makes them happy. Frank (2004), for example, highlights the fact that many people choose to live in the suburbs in order to have roomier houses even tough the well-being gains from increased

[4]The expected life-time income of the average citizen grows over time has the composition of the population changes. Ceteris paribus, newborns have a greater expected income in 2009 then they did in 1975.

square footage are inferior to the losses incurred from commuting to work every day [Frank(2004)]. The observation that individuals do not maximize SWB is consistent with the idea that agents are irrational, but even more so with the idea that SWB is not what agents maximize.

The simplest explanation of the the Easterlin paradox is that subjective well-being and utility are not equivalent [Kimball and Willis(2005)]. Happiness, or affect, "defined as the overall goodness or badness of an individual's felt experience at any point in time" is the sum of two components: elation –short-run happiness– and base-line mood –long-run happiness–. High frequency measures of well-being capture the evolution of elation, the reaction to new information about lifetime utility[5]. Low-frequency happiness items reflect long-run happiness, a high-order good much like health, entertainment or nutrition. The conception of happiness and utility as being different is consistent, for example, with behavior models in which utility reflects preferences emerging from evolution while happiness is a more transitory object. In this context, maximizing utility means something very different than maximizing happiness. It implies that agents can behave in a way that makes them unhappy but maximizes their utility. This interpretation of the Easterlin paradox does not imply that the study of happiness and life satisfaction is pointless, rather that such studies inform us about the shape of the production function of long-run happiness (base-line mood), an important determinants of welfare. Under this conjecture, happiness flows are interpreted as reflecting consumption patterns. Chapter IV explores this idea in greater detail by investigating gender differences with regards to the importance of time and time allocation for happiness.

Finally, the most widely accepted solutions to the Easterlin Paradox are the psychological mechanism of income adaptation and social comparison [Easterlin(1974)]), [Stutzer(2004)], [Andrew E. Clark and Shields(2008)]. These concepts refer to the idea that individuals make relative judgments. Income adaptation captures the fact that individuals compare their circumstances with past ones while social comparison captures the fact that individuals compare their circumstances with that of others. As they are the focus of this paper, these explanations are presented in greater detail.

[5]See Kimball, Levy, Ohtake and Tsutsui [Miles Kimball and Tsutsui(2006)] for an example of the use of weekly happiness data to understand the effect of the Katrina hurricane.

Income Adaptation

Hedonic adaptation is defined as "any action, process, or mechanism that reduces the effects of a constant or repeated stimulus" [Frederick and Loewenstein(1999)]. In economic terms hedonic adaptation implies that the extra utility from additional income (goods, health, air quality, leisure ...) declines over time. Individuals get accustomed to improvements in their circumstances. This notion implies non-static preferences in the sense that the very act of consuming a good lowers its marginal utility.

The expressions "hedonic adaptation", "income adaptation", "aspiration level" and "internal habits" are sometimes used interchangeably in the happiness literature. Kimball and Willis distinguish hedonic adaptation from internal habits [Kimball and Willis(2005)]. While the former concept describes the behavior of elation, a rapidly mean reverting component of affect, the latter captures the idea that individuals get disutility from getting less than they are accustomed to (as predicted by their habit stock). When compared to the length of time necessary for someone to process day-to-day information, income adaptation is rather slow [Kimball and Silverman(2008)]. The model presented in the next section is therefore closer in spirit to internal habits as defined by economists than hedonic adaptation as defined by psychologists. Note however that this distinction is seldom made, partly because of the low availability of high frequency data.

Although there exists a plethora of evidence supporting the notion that individuals adapt (in the hedonic sense) to changing circumstances, few provide micro level evidence of adaptation to income specifically. The most commonly cited study is one by Brickman, Coates and Janoff-Bulman who found that, compared to a control group, lottery winners reported only slight increases in their levels of life-satisfaction in the year following their windfall [Brickman and Kilmann(1978)]. More recently, DiTella, Haisken-De New and MacCulloch found empirical evidence of adaptation to income using data from the German Socio Economic Panel [Rafeal Di Tella and MacCulloch(2004)]. They fond that 65% of the initial positive impact of an income gain disappears within four years. Studying lottery winners in Britain, Gardner and Oswald (2006) fond mixed evidence of adaptation to income [Gardner and Oswald(2007)]. Their work suggests that traces of

increased well-being persist beyond the second year following an unexpected income windfall.

Agents who compare their current and previous income care about changes in income, therefore a steadily increasing income can be converted into a steady happiness flow (Fact 3).[6] Happiness decreases when income falls below its historic level and conversely increases when it grows beyond its historic level. In this context, the happiness gap between rich and poor (Fact 1) and between wealthy and developing nations (Fact 2) is a result of discrepancies in income growth rates. The same is true about the evolution of happiness gap over time (Fact 4). The income adaptation hypothesis does not rule out the possibility that countries with similar average income growth rates rank differently on happiness scales. Since country-level data comes from the aggregation of individual data, the distribution of income can play a role in the conversion of economic growth into national happiness.

Social Comparison

Empirical evidence suggesting a negative correlation between happiness and neighbor's income lend validity to social comparison as another explanation to the Easterlin paradox [Luttmer(2004)]. The idea that individuals compare themselves with others is not new; it was first introduced by Veblen in 1899 and later discussed by Duesenberry in 1949 [Veblen(1994)] [Duesenberry(1949)].

If preferences exhibit social comparison richer people are happier because comparisons with others benefit them (Fact 1). Average happiness remains constant over time if, as everyone gets wealthier, relative incomes remain the same (Fact 3). Social comparisons can generate a positive relationship between GDP and SWB in country level cross sections (Fact 2) if agents compare each other across borders. Whether comparisons generate a widening income gap depends on the evolution of the income distribution within a country over time (Fact 4).

[6] Although most models of utility are framed in terms of consumption and not income, happiness research as studied income. Although this is mainly because of data limitation, some have argued that income better reflects individuals' status, conceived to be an important determinant of happiness.

Aspirations

Easterlin's formulation of the mechanisms of adaptation and comparison builds on the concept of aspirations [Easterlin(2001)]. Aspirations reflect the level of income an agent deems necessary (sufficient, good...) to be happy (somewhat happy, very happy ...). When aspirations are formed with reference to past circumstances, agents' preference are adaptative; when they are formed on the basis of others' income, they are comparative. Easterlin explains that aspirations can depend on both past income and others' income. Just as with adaptation, current income gains have the negative effect of raising future aspirations; the level of income needed to elicit the same affective response in the next period thus rises with current income. As income grows, preferences drift over time [Stutzer(2004)].

2.3 A Model of Adaptation and Social Comparison

This section develops a framework for the empirical analysis that encompasses many specifications of the adaptation and comparison mechanism. Many formulations of these preferences have been studied, some of which are presented in Table 2.1 [Rafeal Di Tella and MacCulloch(2004)], [Stutzer(2004)], [Luttmer(2004)], [Dynan and Ravina(2007)], [Vendrick and Woltjer(2007)]. Every formulation relies on the log-linear form to capture the concavity of the relationship between income and well-being. The other functional assumption shared by all of the models is that the comparison between own income and reference income takes the form of a ratio. Although the studies vary quite a bit in terms of defining a reference point, they rely on similar mechanics. The following section makes this explicit.

The model is an extension of Abel (1990) and Grishchenko (2005) [Abel(1990)] [Grishchenko(2005)]. Since the purpose of this paper is to assess the implications of the assumption of equivalence between utility and well-being, the terminology used to describe the model does not distinguish the two concepts. The presentation of the model should highlight the way in which researchers have made inferences about individual preferences on the basis of reduced form regressions. Indeed, much of the empirical work on happiness has been interpreted as being informative about the

shape of an underlying utility function.

2.3.1 Model

The agent's utility depends on the discrepancy between her income (y_{it}) and a reference income (z_{it}). In each period t, the consumer i, living in area j, chooses the level of income that maximizes U_{ijt}.

$$U_t \equiv \sum_{k=0}^{\infty} \beta^j u(y_{t+k}, z_{t+k}) \tag{2.1}$$

where β is the discount factor and z_{jt} is reference income. This definition of reference income is slightly different than a comparison between own and others' income [Dynan and Ravina(2007)]. Here, z_{jt} is solely the element with which the comparison is done. It can be specified to reflect the adaptation (2.2) or social comparison (2.3) mechanism.

$$\text{Adaptation:} \quad z_t = \prod_{m=0}^{\rho} y_{ijt-1-m}^{\gamma_m} \qquad \rho \geq 0 \tag{2.2}$$

$$\text{Comparison:} \quad z_t = \prod_{j \in J} Y_{jt}^{\gamma_j} \tag{2.3}$$

In the adaptation formulation, Equation (2), reference income is made of a combination of own incomes (y_{t-1},...) from the past ρ periods. The parameter ρ indexes the persistence of habit formation. When $\rho = 0$, only last period's income enters the utility function. For values of $\rho > 0$, a higher ρ means that more incomes from a distant past enter the agent's utility function. For simplicity, each past income (m) enters the function with its own weight, γ_m.[7]

In the social comparison formulation, , Equation (3), reference income, Y_{jt}, is the income of the groups with which the agent compares herself. In a manner similar to the adaptation version of the model, different reference groups can compose the reference income of the agent, each with their own weight γ_j. Social comparison models typically assume no persistence in reference income.

[7]This is a simplified but equivalent version of other habit models such as Grishchenko (2005) where $z_{it} = z_{t-1}^{\rho}\, y_{t-1}^{1-\rho}$.

The contemporaneous utility function takes the following form.

$$u(y_t, z_t) = A\left[ln(y_t) - \sum_k \gamma_k \, ln(\tilde{z}_t)\right] + B \tag{2.4}$$

where A is the scaling parameter, providing the ratio at which income and reference income are converted into well-being. B is an intercept term that reflects the fact that factors out of the agent's control, such has her personality and gender, influence her well-being. $\tilde{z}_t$ is the linearized reference income. The second term is thus the weighted (γ_m or γ_j) sum of past or reference groups' incomes. The parameter γ captures the degree of separability of the utility function and is the parameter of interest in the analysis. Also, it should be noted that the model is specified in a way such that γ is positive. With this formulation, a negative γ reflects the preferences of an agent who is made better-off when past income or the income of the reference group rises. Whether a growing income is converted into a steady happiness flow or whether generalized income gains leave unaffected the average well-being depends on the value of the γs. Observe that this formulation corresponds to the isoelastic form with a coefficient of relative risk aversion equal to one.[8].

It should be clear that Equation (2.4) does not rule out the possibility that the agent cares about both her income level (L) and how it relates to reference income (R), or relative income. Rearranging the terms makes this explicit.

$$u(y_{it}, z_{it}) = \gamma_L \, ln(y_t) + \gamma_R \, ln(\frac{y_t}{z_t}) + B$$
$$\gamma_L = A(1-\gamma) \qquad \gamma_R = A\gamma$$

Equation (2.4) also highlights how the γ coefficient can be estimated using linear regressions. This equation is the backbone of almost every specification used in studies of subjective well-being. Hopefully, the formalization shows how different specifications can be compared but more importantly, how their capacity to emulate happiness flows hinges on the same mechanics: the degree of separability. For that reason, throughout the paper, the econometric results will be presented in

[8] $u(y_t, z_t) = \frac{1}{(1-\alpha)}[y_t / z_t^{\gamma}]^{(1-\alpha)}$

terms of the degree of separability of the function γ throughout the paper.

2.4 Empirical Strategy

The objective of the analysis is to show that merely designing functions that solve the Easterlin paradox is of limited use when the exercise is not grounded in microeconomic data. More precisely, the analysis shows that some of the models put forward as solutions to the happiness income puzzle fail to receive empirical validation. For both the income adaptation model and the social comparison model, the analysis begins with a comparison of the level of separability inferred from aggregate data (or simply hypothesized in the literature) with the one obtained using micro-level analysis. When the model passes this initial test, the models' ability to replicate the empirical features of the relationship between income and well-being, i.e. Facts 1 through 4, is evaluated.

2.4.1 Income Adaptation

The idea that economic growth should not be a goal of governmental policies stems from the interpretation of figures such as Figure 2.3 as evidence that individuals fully adapt to changes in income, i.e. $\gamma = 1$. This conclusion emerges when equations like Equation (2.4) are estimated with aggregate data as if the economy as a whole was representative of a single agent. To verify the appropriateness of this approach, the following two equations are estimated and compared.

$$SWB_{jt} = \alpha + \beta\, ln(Y_{jt}) + \delta_1\, ln(Y_{jt-1}) + ... + \delta_m\, ln(Y_{ijt-n}) + \epsilon_{itj} \tag{2.5}$$

$$SWB_{ijt} = \alpha + \beta\, ln(y_{ijt}) + \delta_1\, ln(y_{ijt-1}) + ... + \delta_m\, ln(y_{ijt-n}) + X'\lambda_k + \phi_{ij} + \epsilon_{itj} \tag{2.6}$$

Equation (2.5) relates average national well-being (SWB_{jt}) to average GDP per capita (Y_{jt}). Equation (2.6) relates individual well-being (SWB_{ijt}) to individual income (y_{ijt}). In Equation 2.6, X is a vector of individual characteristics that includes the respondent's age and its square, his ethnic-

ity, gender, religion, employment status, number of children in his household and marital status. The vector ϕ is a vector of individual fixed effects included whenever the data permits. Because the GSS is not a panel, the analysis of the adaptation model involves the transformation of the cross-sections into a pseudo-panel of income quintiles, taken to reflect the income and happiness of representative agents in each income group. More precisely, the analysis is conducted with the average residual happiness of the income quintile from a first stage regression of happiness on the individual characteristics in X. Doing so lowers the number of observations to five per year. Both equations generate estimates of $\hat{\gamma}$ that can be obtained by taking the ratio of the lagged income and current income coefficients, equivalent to taking the ratio of A to $A\gamma$ in Equation (2.4).

$$\text{(2.7)} \qquad \text{Adaptation:} \qquad \hat{\gamma_m} \;=\; -\hat{\delta_m}/\hat{\beta}$$

The estimate obtained with Equation (2.5) are compared to those obtained with Equation (2.6).

2.4.2 Social Comparison

The lack of serial correlation between aggregate well-being and economic growth has also often been seen as evidence that individuals care solely about their relative position on the income ladder. Some suggest that economic growth actually leaves people worse-off.[9] Of the many existing specifications of the reference group, the analysis will focus on the World's GDP, GDP in the respondent's country and the average income in the agent's region as candidate reference incomes. The analysis starts by asking whether individual well-being does indeed respond to these candidate reference incomes by estimating the following equation.

$$\text{(2.8)} \qquad SWB_{ijt} \;=\; \alpha \;+\; \beta\, ln(y_{ijt}) \;+\; \eta\, ln(Y_{jt}) \;+\; X'\lambda_k \;+\; \phi_{ij} \;+\; \epsilon_{itj}$$

The coefficients and variables are the same as previously described with the exception of reference income, Y_{jt}. The focus of the analysis is once again the separability parameter. According to the

[9] Average happiness decreases in the face of widespread income gains when the negative externality of ones income for others' happiness is larger than the own effect.

model, η will be negative, and consequently γ will be positive, if individuals derive well-being from having more income than the reference point. As previously explained, γ is obtained by taking the ratio of the own income and the reference income coefficients.

$$\text{Comparison:} \qquad \hat{\gamma_j} \quad = \quad -\hat{\eta_j}/\hat{\beta} \quad \text{if} \quad \rho = 0 \tag{2.9}$$

The estimated γ can be compared to what the literature suggests, permitting assessment of the empirical foundation of each of the three reference income candidates. A discussion of the capacity of the models that find empirical support to replicate the other stylized facts follows.

2.4.3 Data

Recent work suggest that the Easterlin paradox could be an isolated American phenomenon [Stevenson and Wolfers(2008a)]. For that reason, the analysis concentrates on countries with an unambiguous pattern of positive economic growth and no improvement in average well-being: the US and Germany.

Two sources of data are used for the analysis. The General Social Survey (GSS) is a repeated micro-level cross section of about 1600 Americans covering the years 1972 to 2006 (with some gaps). The German Socio Economic Panel (GSOEP) is a yearly panel of about 2750 German adults. The GSOEP contains detailed socioeconomic information as well as a life satisfaction measure over a period ranging from 1984 to 2005. Two other sources were used to generate graphics: the World Values Survey (WVS), a repeated cross-section of roughly 5000 respondents from different countries in the world, and the Eurobarometer (EB), a repeated cross-section of anywhere between 450 and 4250 respondents (averaging at about 1600) from different European nations, including Germany, from 1974 to 2004. The same countries are typically sampled annually with additional countries added over time.

Well-Being

Table 2.2 reports the questionnaire items used to measure subjective well-being in each of the surveys. The table also reports the average and standard deviation obtained when equally spaced numerical values are attributed to each of the item answers. Because the questions are different for each survey, when displaying data graphically, Stevenson and Wolfers method for aggregating well-being scores across groups is used [Stevenson and Wolfers(2008a)]. The idea is to report the coefficients from ordered probit regressions of subjective well-being on group dummies (with no other controls) as the average well-being for that group. The coefficients reported should be interpreted as well-being indices that capture shifts in an underlying normally distributed latent well-being variable. Unless otherwise specified, the ordered probits are estimated on the whole sample (all years, countries, etc.). Depending on the grouping variables used, the procedure allows for different levels of aggregation.

Income

Table 2.3 presents the details of the questionnaire items used to collect the information about respondents' income. The GSOEP is the only source of data offering non-categorical income measures. The GSS and the EB rely on roughly 5 to 15 income categories per country-wave; for these surveys the income variable is converted into a numerical figure by assigning to it values that correspond to the mid-point of the income categories chosen by the respondent. The highest income bracket is converted by adding half of the distance between the top and bottom bounds of the previous category to the lowest bound of the top category.[10] For most surveys, the income categories do not change annually but do so at least every five years, which is relatively frequent.

GDP per capita, World GDP per capita and CPI, used to convert nominal into real figures, come from the World Penn Tables [of Pennsilvanya(2007)] or the OECD web site [OECD(2007)]. When the analysis uses regional income, the figure represent an aggregation of the respondent's income for each of nine regions in the GSS and fifteen regions in the GSOEP. The GSS provides

[10]For example, if the previous to last category is $45,000 to $55,000 and the top category is $55,001 and up, the numerical figure attributed to respondents that chose the top income category is $60,000.

information about each respondent's regions (e.g., New-England, Atlantic, etc.) The GSOEP's regions are somewhat geographically smaller and include Berlin and Bavaria.

2.5 Analysis

2.5.1 Income Adaptation

To highlight the mechanics of the separability parameter of the utility function, the top graphic of Figure 2.5 presents simulated happiness flows for preferences exhibiting income adaptation and no memory in the habit stock ($\rho = 0$). Happiness is simulated by feeding US GDP into Equation (2.5). The effect of γ is clear; the happiness flow becomes more volatile and the positive time trend diminishes as it increases.[11] The bottom graphic of Figure 2.5 compares the happiness simulated with perfect income adaptation ($\gamma = 1$) against measured average happiness. As is evident, simulated happiness does fairly well at emulating observed well-being well. This illustrates the reasoning behind the interpretation of the Easterlin paradox as evidence that people perfectly adapt to income.

Columns (1) to (4) of Table 2.4 report macro-level estimates of Equation (2.5) as well as the corresponding $\hat{\gamma}$s. The estimates from columns (1) and (3) were obtained with only one period included in the reference income ($\rho = 0$). Columns (2) and (4) presents the estimated coefficients obtained with three lags in the reference income. One way to interpret the γ is to view it as the level of adaptation, or separability, necessary to convert measured GDP into the observed aggregate well-being flow. For the US, the estimated γ is significant and suggest better than perfect income adaptation, $\gamma > 1$. In Germany, the estimates are more imprecise, partly because the time series is shorter, and suggest an even higher level of adaptation. Because average life satisfaction in Germany has been falling, rather than being stagnant over the period studied, converting an increasing GDP into decreasing well-being requires even higher levels of adaptation. Nonetheless, the $\hat{\gamma}$s reflect the level of adaptation that can be inferred from aggregate data; such estimates are the under-pinnings of the idea that people perfectly adapt to income.

[11] The time trend becomes insignificant when γ reaches 1. Not shown.

Columns (5) to (8) of Table 2.4 report micro-level estimates of Equation (2.6) and the corresponding $\hat{\gamma}$s, with income measured at the individual level. Since the GSS is a repeated cross-section, the estimates were obtained by converting the data into a pseudo-panel of income quintiles. The coefficients are obtained by estimating 2.6 with residual happiness from a regression of individual happiness on the controls. When compared to the estimates obtained with aggregate data, the level of separability suggested by the micro analysis is much lower. The analysis of US data reveals no trace of adaptation, but once again the sample size is rather small (5 quintiles for 35 years). Perhaps more convincing are the estimates obtained with the GSOEP data. These regressions, which include individual fixed effects as well as a range of controls, find evidence of moderate adaptation. Specification (7) suggests that the negative effect of past income (-0.0915) is about a third of the positive effect of contemporaneous income (0.2943) in the utility function. The corresponding γ is 0.31.

Using the same data, DiTella, Haisken-De New and MacCulloch use a "back of the envelope" calculation to interpret the level of adaptation that they estimate [Rafeal Di Tella and MacCulloch(2004)]. They look at the permanent effect of economic growth by computing the portion of the initial rise in well-being remaining after the four period of adaptation allowed (leaving aside for now the fact that some of these coefficients are not-significant). According to the estimation presented in column (8), 0.1445 of the initial impact remains after four years (0.2935-0.0651-0.0268-0.0332-0.0239). In Germany, real GDP per capita rose by 129% (GDP was 2.3 times larger in 2004 then in 1984) over the period covered by the GSOEP. The impact on life satisfaction suggested by the model, would be to raise well-being by 0.12 on the 0-10 scale (0.14*ln(2.3)) or 7% of a standard deviation (0.12/1.77). DiTella and al's interpretation is that such a level of adaptation is "sufficiently large as to be able to explain why no long-run trend in happiness is observable over several decades" [Rafeal Di Tella and MacCulloch(2004)]. The problem with the reasoning however, is that although 7% of a standard-deviation over 20 years might seem like a negligible rise in happiness, in Germany aggregate subjective well-being did not remain flat during that period but fell by 40% of a standard deviation. Clearly adaptation is at best a partial solution to the Easterlin paradox.

Income Adaptation as a Solution to the Happiness Income Puzzle

Although at the country level the empirical relationship between happiness, contemporaneous and past income appears consistent with high levels of income adaptation there is no evidence of perfect income adaptation at the individual level. Furthermore, the level of separability of the happiness function estimated with micro-economic data is insufficient to explain the lack of growth in aggregate happiness. Moreover, perfect income adaptation has very specific behavioral implications that remain controversial in other fields; Section 2.6 discusses that topic.

2.5.2 Social Comparison

This section verifies whether the social comparison models presented as solutions to the happiness income puzzle in the literature find empirical support. Three reference income measures are studied: average national income, average regional income and average world income.

Table 2.5 presents different estimations of Equation 2.8. All specifications include socio-demographic controls. The left-hand side, columns (1) to (4), reports estimates obtained with the GSS data while the right-hand side reports those obtained with the GSOEP data. The coefficients come from linear regressions. For each specification, γ is reported on a separate line. The GSOEP allows the inclusion of individual fixed effects. The middle two lines thus also report estimates of the degree of separability with and without individual fixed effects. When the reference income is the country's GDP or the World's GDP, the errors are clustered at the year level. When average regional income is used as the reference income measure, the errors are clustered at the regional level. The coefficients of the control variables have been left out to make the table more concise.

GDP per capita

As expected, own income has a positive effect on individual subjective well-being in all specifications. Columns (1) and (5) estimate the happiness function of agents that care about how their income compares to the nation's average, as in Clarck and al 2008 [Andrew E. Clark and Shields(2008)]. If this social comparison model is accurate, the coefficient on $ln(GDP)$ should be

negative. This is not the case in either column. In the GSS, the coefficient on $ln(GDP)$ is insignificant and in the GSOEP, it is positive (significant). The corresponding estimated γ's are thus either nonsignificant (-0.49) or negative (-14.45). Excluding the fixed effects in the GSOEP reverses the sign of the coefficient and generates the expected negative coefficient on $ln(GDP)$, as indicated by the positive estimate of separability reported (5.06). One reason for a positive coefficient on GDP may be that the negative status effect of average income is overwhelmed by the positive effects of a rising GDP per capita documented by Helliwell [Helliwell and Huang(2005)]. Unfortunately, the data does not allow for separation of these effects. Regardless, if the analysis is correctly specified, the lack of negative association between GDP and individual well-being should be interpreted as evidence that models of social comparison using the average national income to measure reference income receive mixed empirical support at best.

Regional Income

Columns (2) and (6), estimate the happiness function of agents whose reference group is geographically closer to them, i.e. people in their region. The coefficients estimated with the GSS data support the idea that people care about how they compare to their neighbors. The estimated degree of separability is 1.45, which suggests that agents care even more about their neighbors' income than their own. This is the type of coefficient magnitude that has led some to the conclusion that economic growth leaves everyone worse off. However, contrary to what the model predicts, in the GSOEP, the effect of regional income is positive, γ is negative at -4.56. Column (6) also reports the corresponding γ obtained without the fixed effects; it is positive (2.24). Here too, time invariant personal characteristics appear to change the effect of reference income.

In his analysis, Luttmer found the negative effect of neighbor's income to be robust to fixed effects. The current analysis does not reach the same conclusion. The pattern of estimates obtained with and without the fixed effects suggests that regional income might have a negative effect on individual well-being because unobservable individual characteristics that make individuals happy also affect their decision of where to live. This could be the case if, for example, people favorably disposed to happiness chose to live in poorer rural areas. Others, like Barrington-Leigh and Helli-

well, have documented the fact that the geographic scale at which people make comparison is the metropolitan region in which they live [Barrington-Leigh and Helliwell(2008)]. For that reason, although it is unclear why the result depends so heavily on the inclusion of fixed effects, it appears that models of social comparison where the region is the reference point can be considered a potential explanation to the Easterlin paradox.

World GDP per capita

Column (3) and (7) estimate the happiness function of agents that care about how their income compares to the world's average. Here, both the GSS and the GSOEP estimates (with fixed effects) reject the idea that people make comparisons across borders. In both data set, the coefficient on $ln(World)$ is not significantly different then zero. This type of model is rejected.

Mixture Model

Finally, columns (4) and (8) estimate models of social comparison that include all three reference group. One interpretation of such models is that agents care about how their income compares to the average income in their region but also how the average income in their region compares to the national average and so on and so forth with the other reference points. The following illustrates this idea and shows how such models are equivalent to the one estimated in Table 2.5.

$$SWB_{ijt} = \beta_1\, ln(y_{ijt}) + \beta_2\, ln(\frac{y_{ijt}}{Y_{jt}}) + \beta_3\, ln(\frac{Y_{jt}}{GDP_t}) + \beta_4\, ln(\frac{GDP_t}{W_t}) \\ \beta_0 + X'\lambda_k + \phi_{ij} + \epsilon_{itj} \tag{2.10}$$

$$SWB_{ijt} = (\beta_1+\beta_2)\, ln(y_{ijt}) + (\beta_3-\beta_2)\, ln(Y_{jt}) + (\beta_4-\beta_3)\, ln(GDP_t) \\ -\beta_4\, ln(W_t) + \beta_0 + X'\lambda_k + \phi_{ij} + \epsilon_{itj} \tag{2.11}$$

In the GSS, the only reference group to have a significant effect on individual well-being is regional income, further confirming the idea that people compare their income to others who are geographically proximate. The alternative interpretation is that this could be due to the fact that β_3 and β_4 are of similar magnitude, nullifying the apparent effect of GDP. However, since β_4 is not signifi-

cantly different than zero, this is unlikely. The results are reversed in the GSOEP; regional income is the only reference point that is not significantly linked to individual well-being. Interpreting this constellation of coefficient under Equation (2.11) suggests that $\beta_3 > \beta_2 > \beta_4 > \beta_1$ but also that β_1, the coefficient on own income, is negative. Here too, leaving the fixed effects out of the estimation reverses the results, the γ computed for regional income for that model is reported (1.0630). The mixture model is too inconsistent with the previous finding that people make geographically close comparison to be taken as a serious candidate for an explanation.

Social Comparison as a Solution to the Happiness Income puzzle.

Two main pieces of information emerge from the estimation. Firstly, out of the three reference income measures studied, the only model of social comparison truly grounded in the data is the regional income model. Secondly, the choice of specification has a a large impact on the results; the inclusion of individual fixed effects changes the coefficients on reference income for all three specifications. This is consistent with Ferre-i-Carbonell and Fritjers finding that, unlike the inclusion of fixed effects, assuming cardinality or ordinality matters little for empirical analysis [i Carbonell and Fritjers(2004)]

Figure 2.6 presents the happiness flows predicted by the social comparison model with regional comparisons. Compared to observed happiness (Figure 2.4) the predicted flows do relatively well. The model can accurately replicate the ordering of the income quintiles (Fact 1), the lack of growth in average happiness in the US and the fall in average life satisfaction in Germany (Fact 3). The predicted flows also mimic the widening of the rich poor happiness gap.

The main limitation of a model with geographically close social comparison is that it fails to explain why richer nation are happier than poorer ones (Fact 3). Indeed, if agents only care about how their circumstances compare to that of their neighbors, there is no reason why citizens of India should be less happy than citizens of France. Of course, one can think of many reason as to why this would be the case. The important point though is that status effects, however important, are incompatible with that fact when taken alone. The social comparison explanation to the Easterlin paradox is not one of missing variables.

Inferring from the Easterlin paradox that the US government should stop pursuing economic growth is one thing. Reaching the same conclusion about India is another. The Clark et al (2008) models of national or international comparison do not meet the test of empirical validation. The only spectrum of comparison that passes the test is the regional reference point, but the literature suggests that better data would probably diminish the relationship between happiness and regional comparison. Although it can replicate many of the characteristics of the puzzling relationship between income and subjective well-being, regional social comparison alone fails to explain why richer countries are happier. The following section presents a breif discussion of the potential role of income equality in understanding the Easterlin paradox.

2.6 Discussion

2.6.1 The role of Inequality

Rousseau (2009) discussed the importance of accounting for inequality when attempting to interpret the happiness-income puzzle. He showed that although they are consistent with adaptation and comparison models, the patterns observed in the US can also be explained by standard utility models if the increase in income inequality and the concavity of the happiness function are properly accounted for [Rousseau(2009)]. When trying to understand the mechanics of the happiness function, it is crucial to account for the concavity of the function because it can create a discrepancy between income and happiness. Two countries with the same average GDP per capita can have different levels of average well-being if their income distribution differs. More equal countries will tend to have higher average happiness simply because of the concavity of the happiness function. A different interpretation of this insight is that a more accurate way to interpret the Eaterlin paradox is that (in part because of status effects), economic expansion raises average happiness when the growth benefits the whole income distribution.

2.6.2 Perfect Income Adaptation

Models of adaptation have been widely discussed in macroeconomics. Although the approach used to identify these types of preferences are very different than the one used in this paper, the following presents a brief discussion of the similarities.

Internal habit forming agents exhibit very specific behavior that helps reconcile some of the puzzles of macroeconomics and finance. Habit formation models have come to the rescue of rational expectations models in explaining the *equity premium* and the *excess smoothness* puzzles [Mehra and Prescott(1985)], [Constantinides(1990)], [Campbell and Cochrane(1999)] [Luttmer(2000)], [Lawrence J. Christiano and Evans(2005)]. The risk premium puzzle refers to the fact that classical economic models of behavior require preferences that exhibit unreasonably high levels of risk-aversion to explain the spread between the rates of return of stocks and risk-free assets [Mehra and Prescott(1985)]. The excess smoothness puzzle refers to the fact agents react less to unexpected income windfalls than the permanent income hypothesis would predict.

Agents whose preferences exhibit an extreme level of internal habit, i.e agents who perfectly adapt to income, allocate their resources over time to spread consumption growth rather than consumption. As a result, the response of consumption to an unexpected windfall follows a "hump-shape" pattern [Luttmer(2000)]. Agents with habits smooth the discrepancy between consumption and the habit stock rather than consumption itself. Put differently, they allocate income windfalls in order to spread income growth. Their reaction to income shocks is sluggish because contemporaneous consumption raises the burden of the habit stock in future periods. When agents form internal habits, they also demand less risky assets because relative to habitless agents they lose more utility when their income drops below their reference level.

Empirical estimates of γ, the habit coefficient using revealed preference methods are typically fairly high. Fuhrer found 0.90 [Luttmer(2000)], Christiano et al found 0.65 [Lawrence J. Christiano and Evans(2005)], Bouakez et al found 0.98, Dennis found 0.88 and Giannoni and Woodford found 1.00. This is the another reason why interpreting the Easterlin as evidence of adaptation is tempting; it would also help to explain macroeconomic puzzles.

Additively Separable Internal Habits

An alternative formulation of the utility function, which departs from the standard macroeconomic literature, is to allow utility to be additively separable with regards to the habit stock. This does not preclude agents from caring about past circumstances but leads to the same behavioral patterns as the standard framework of the problem without habit formation. The following model illustrates this:

$$u(y_t, z_t) = u(y_t) - \gamma\, u(z_t) \tag{2.12}$$

Indeed, with no persistence ($\rho = 0$), substituting (2.12) into (2.1) and differentiating with respect to y_t yields

$$\frac{\partial U_t}{\partial y_t} = \frac{\partial u(y_t)}{\partial y_t} \cdot (1 - \beta\gamma)$$

which has the same behavioral implication as the standard version of the problem, i.e. income (consumption) is smoothed over the life-time.

2.7 Conclusion

The use of subjective well-being items to measure utility is controversial. One way researchers have found to establish the method, i.e. the equivalence between happiness and utility, is to formulate mathematical functions to that end that behave like well-being. The idea is that if happiness and its puzzling relationship to income can be rationalized by functions, it can be considered a valid proxy for utility. This paper proposes a true test of these functions which are put forward as solutions to the Easterlin paradox.

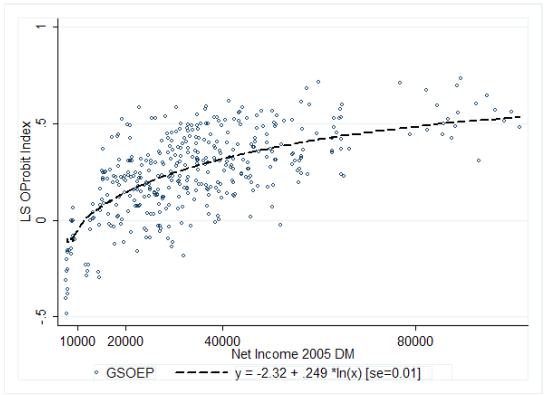
The analysis reveals that when these functions are estimated at the individual level, models of income adaptation suggest levels of habituation that are too low to explain why economic growth does not raise average happiness. Out of three candidate reference point for social comparison, only regional income is supported by empirical analysis. The model has the capacity to replicate

all but one of the feature of the relationship between income and happiness. While it explains Fact 1,3 and 4, it cannot explain why richer countries have happier citizens.

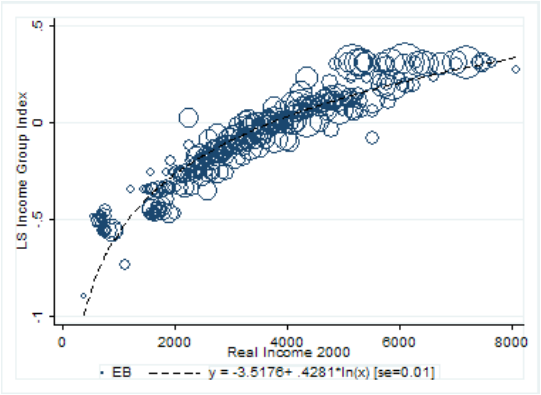
The paper proposes paths of reflection for future research and argues that a proper interpretation of the Easterlin paradox should take into account the concavity of the happiness function as well as the evolution of the income distribution over time. The claim that survey measures of happiness can serve as a proxy for utility is attractive. For that reason, it appears crucial that more effort be invested in understanding exactly what economist can learn from happiness research.

Figure 2.1: The Well-Being Function in the US and West-Germany.

(a) Happiness in the US (GSS)



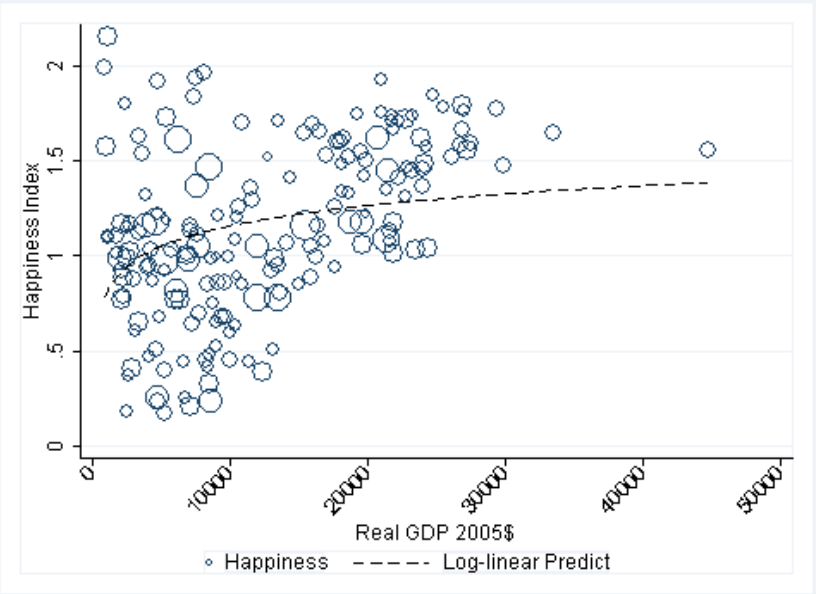
(b) Life Satisfaction in Germany (GSOEP)



(c) Life Satisfaction in Germany (EB)

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

Figure 2.2: Average Well-Being and Real GDP per Capita Across the World for the Four Waves of the World Values Survey.

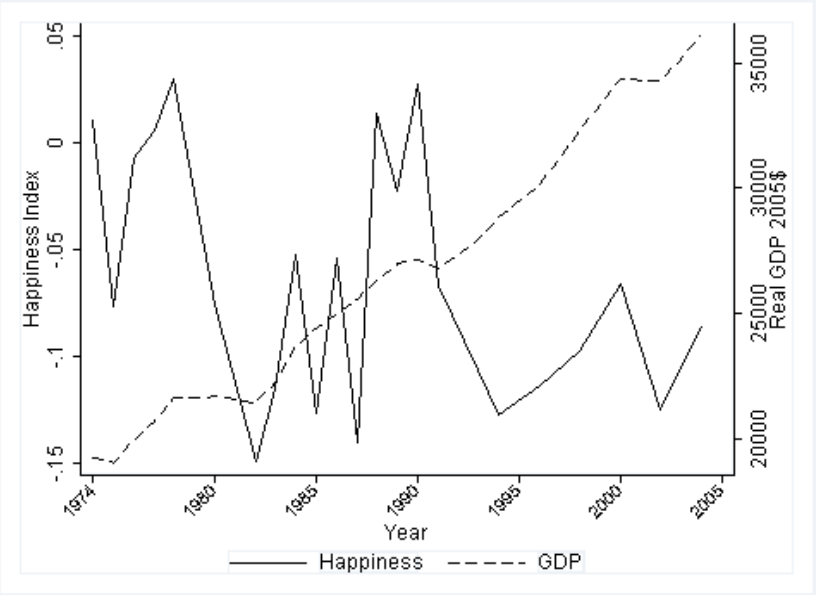


(a) Happiness

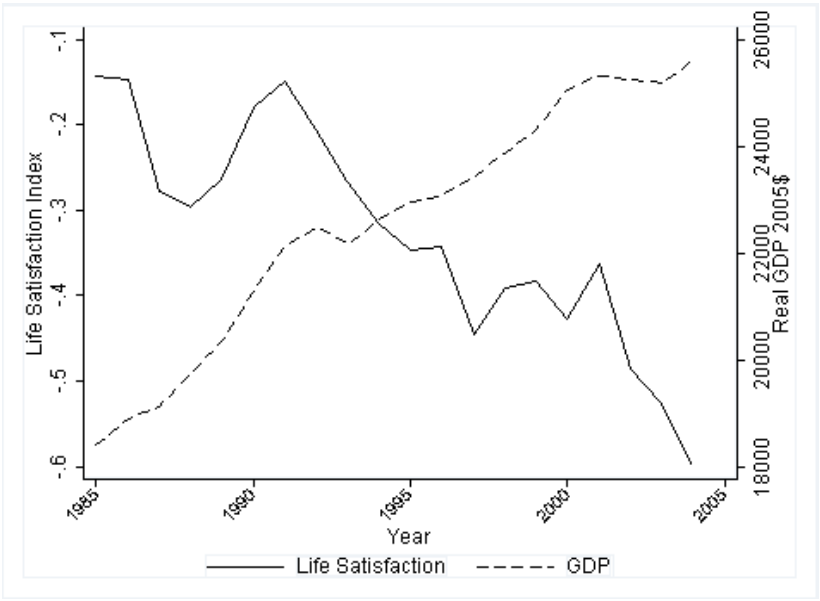
(b) Life Satisfaction

Note: Figure displays happiness index, the coefficient of an ordered probit regression of well-being on country-year dummies.

Figure 2.3: Average Subjective Well-Being Over Time in the US and Germany.



(a) US (GSS)

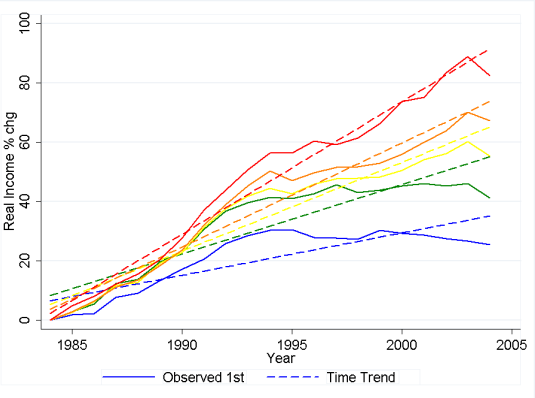


(b) Germany (GSOEP)

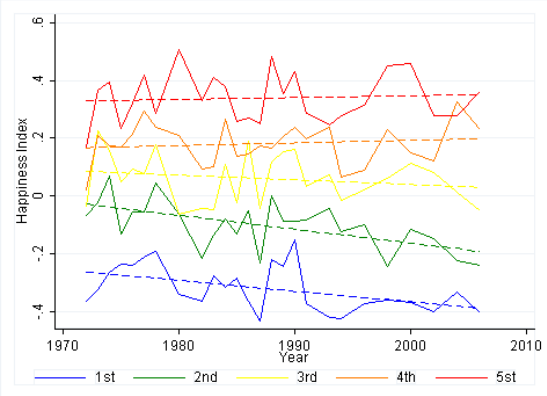
Note: Figure displays happiness index, the coefficient of an ordered probit regression of well-being on country-year dummies.

Figure 2.4: Average Well-Being of the Income Quitiles and the Rich-Poor Happiness Gap in the US and Germany.

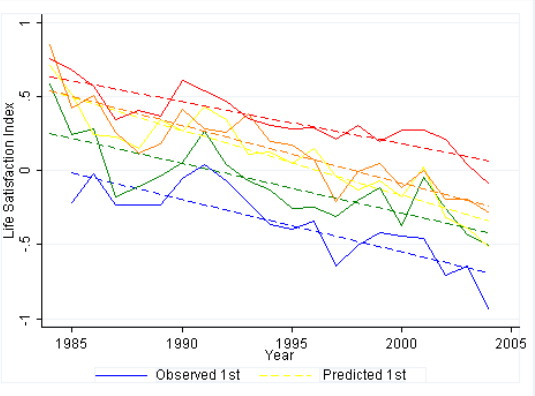
(a) Income % Changes (GSS)



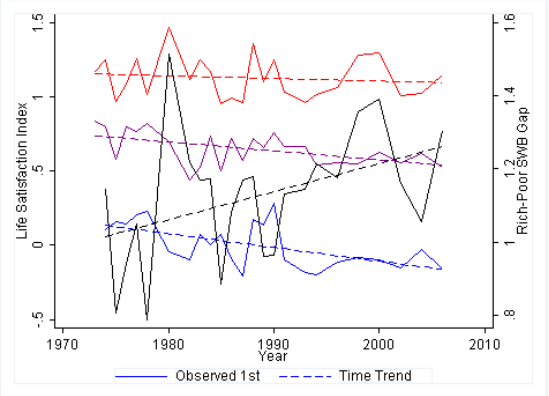
(b) Incomes % Changes(GSOEP)



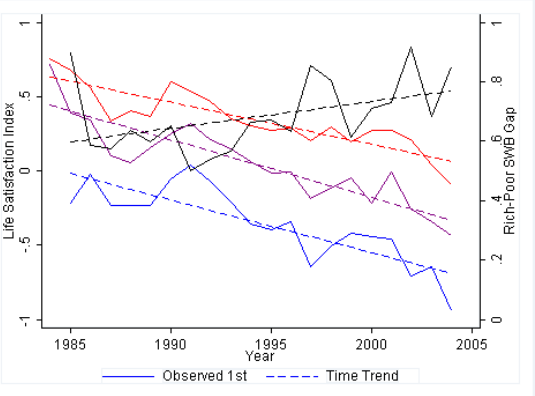
(c) Happiness (GSS)



(d) Life Satisfaction (GSOEP)

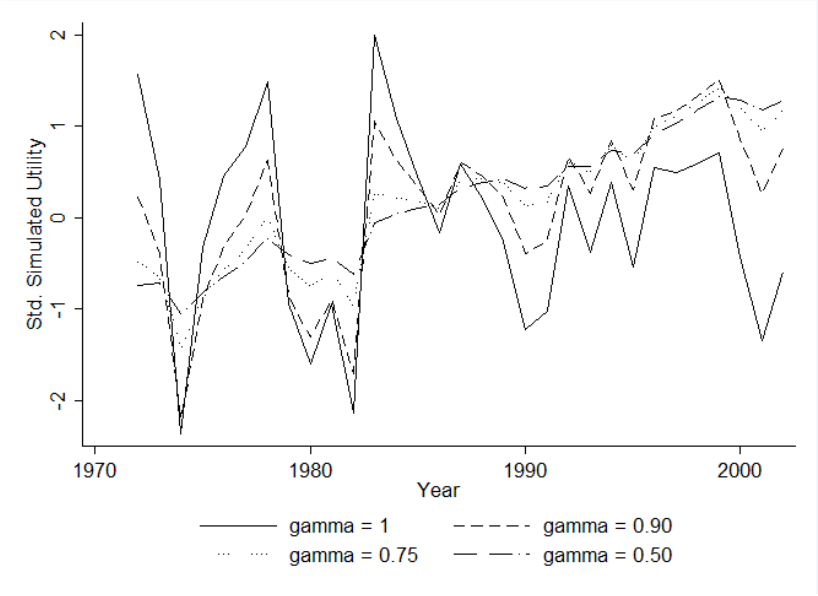


(e) US (GSS)

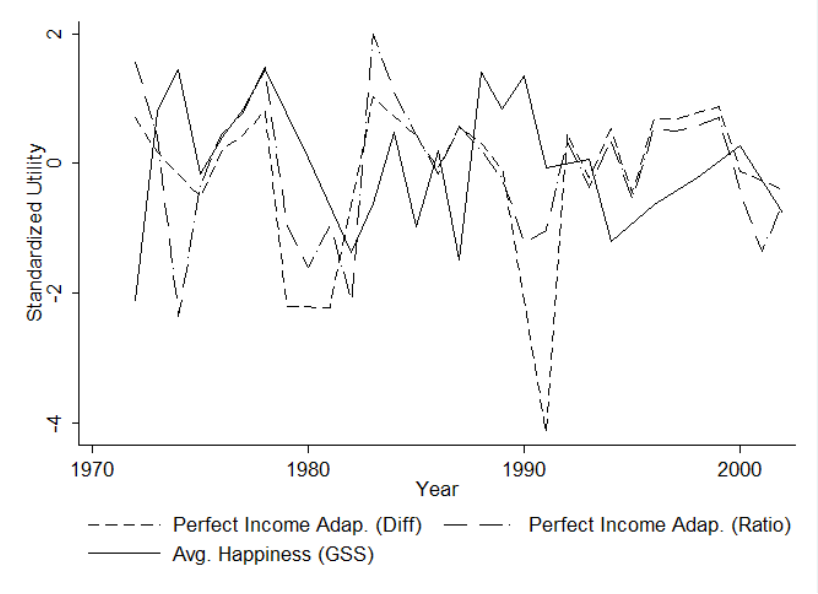


(f) Germany (GSOEP)

Figure 2.5: Simulated Happiness for different levels of Income Adaptation (γ)



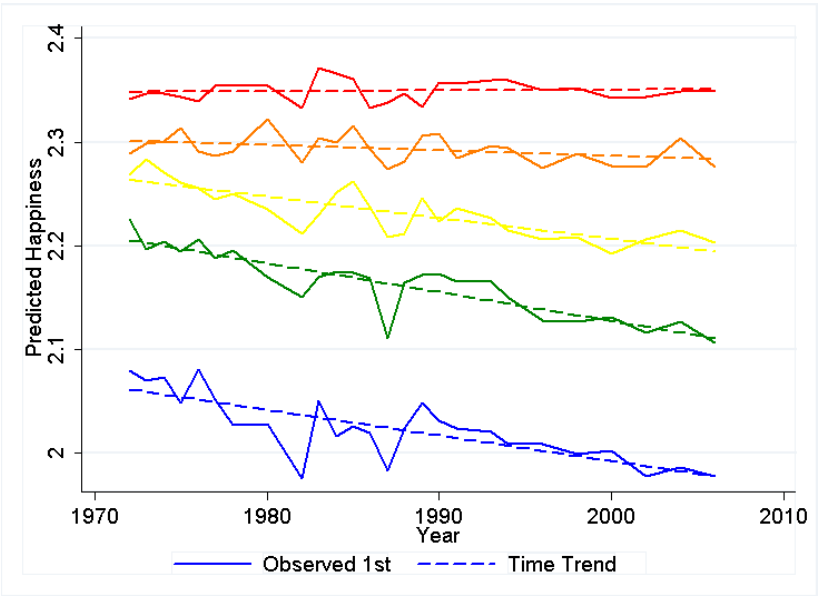
(a) Different γ



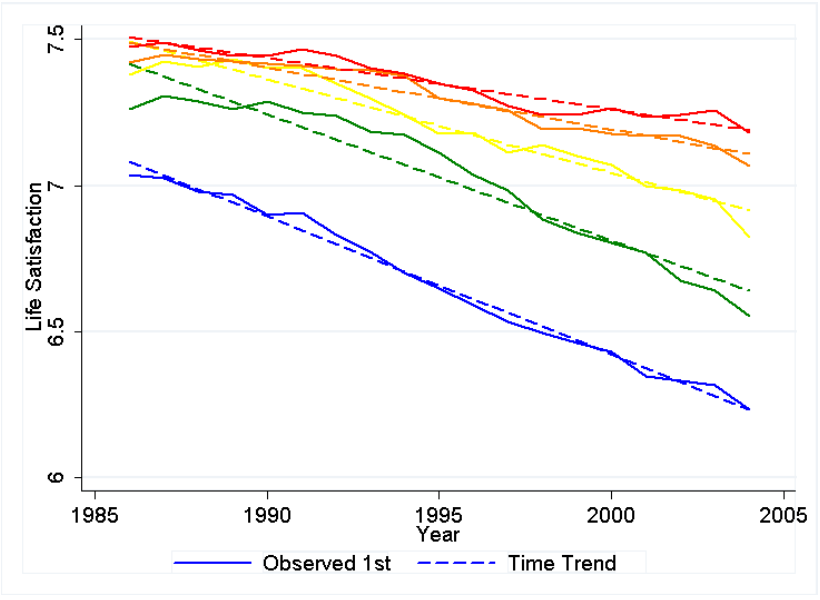
(b) $\gamma = 1$

Note: Figure displays simulated happiness obtained by feeding the GDP into Equation 2.4

Figure 2.6: Happiness predicted by Regional Social Comparison



(a) GSS



(b) GSOEP, with f.e.

Note: Figure displays well-being as predicted the a social comparison model of with regional income as the income of reference.

Table 2.1: Well-Being Functions from the Happiness Literature.

Source	*Happiness Function*
DiTella and MacCulloch (2004)	$SWB_i t = \alpha_0 ln(y_t) + \alpha_1 ln(y_{t-1}) + ...\alpha_T ln(y_T) + \beta_0 ln(S_t) + \beta_1 ln(S_{t-1}) + ...\beta_T ln(S_T) + \delta X_i t + f_i + \eta_t + \epsilon_{it}$
y_{it} is income and S_{it} is status. X_{it} are controls, f_i are fixed effects and η_t are wave effects.	
Stutzer (2004)	$SWB_i = \alpha + \beta ln(y_i) + \gamma ln(y_i^*)_\delta X_i + \epsilon_i = \alpha + (\beta + \gamma) ln(y_i) + \gamma ln(y_i^*/y_i) + \delta X_i + \epsilon_i$
y_i is individual income and y_i^* is aspirations, (y_i^*/y_i) is relative income and X_{it} are controls.	
Luttmer (2004)	$SWB_i = Y_{pt}^* \beta_1 + X_{it}\beta_2 + X_p \delta + wave_t \beta_4 + \delta_s + \epsilon_{ispt}$
Y_{pt}^* is reference income. X_{it} is a vector of personal characteristics including personal income. X_p is a vector of regional characteristics and δ_p is a vector of state dummies.	
Vendrick and Woltjer (2007)	$SWB_{it} = \alpha + \tilde{\beta} ln(y_{it}) + \gamma ln(y_{it}^*) + \delta X_{it} + f_i \epsilon = \alpha + (\tilde{\beta} - \gamma) ln(y_{it}) + \gamma ln(y_{it}/y_{it}^*) + \delta X_{it} + f_i + \epsilon$
y_i is individual income and y_i^* is reference group's income, (y_i^*/y_i) is relative income. X_{it} are controls and f_i are individual fixed effects.	
Dynan and Ravina (2007)	$SWB_{it} = \rho_0 + \rho_1 ln(y_{it}) + \rho_2 ln(y_{it}^r) + \rho_3 \Phi_{it} + \epsilon$
y_i is individual income and y_i^r is the difference between average earning within a person's education-occupation-state-year and the average earnings within a person's state-year. Φ_{it} are controls.	
Barrington-Leigh and Helliwell (2008)	$SWB_{it} = c + \alpha X_i + \beta y_i + \sum_{r \in R_i} (\delta_r \bar{y_r} + \gamma Z_r + v_r) + \epsilon_i$
y_i is individual income and y_i^r is the income of reference groups varying in geographic size centered around the respondent. Z_r are regional characteristics X_{it} are controls	
Clark, Fritjers and Shields (2008)	$SWB_{it} = \alpha + \beta_1 ln(y_{it}) + \beta_2 ln(y_{it}/y_{it}^*) + \delta X_{it} + \epsilon = \alpha + \beta_1 ln(y_{it}) + \beta_2 ln(y_{it}/y_{it}^*) + \beta_3 ln(y_{it}^*/y_t^*) + \delta X_{it} + \epsilon$
y_i is individual income and X_{it} are individual level controls and include weekly hours of work. In the social comparison model, y_{it}^* is the average national income and y_i^* is World's average income. In the adaptation model, y_{it}^* is a convex combination of past incomes.	

Table 2.2: Well Being Questions from Different Data Sources.

Source	Question
General Social Survey	*Taken all together, how would you say things are these days would you say that you are:* 1. Very Happy 2. Pretty Happy 3. Not too Happy $\bar{H} = 2.20$ $\sigma = 0.63$
German Socio Economic Panel	*In conclusion, we would like to ask you about your satisfaction with your life in general.* 0. Completely dissatisfied (...) 10. Completely satisfied $\bar{LS} = 7.12$ $\sigma = 1.77$
Eurobarometer	*"Taking all things together, how would you say things are these days, would you say you're:"* 1. Very Happy 2. Pretty Happy 3. Not too Happy *"Please tell me whether you are _____ with your life in general?"* 1. Very satisfied 2. Fairly satisfied 3. Not very satisfied 4. Not at all satisfied

Table 2.3: Income Questions From Different Data Sources.

General Social Survey

"In which of these groups did your total family income, from all sources, fall last year ***before taxes****, that is? Just tell me the letter."*

A. Under $1,000 ... Y. $150,000 or over

German Socio Economic Panel

"If you take a look at the total income from all members of the household: how high is the monthly household income today?" Please state the ***net monthly income****, which means after deductions for taxes and social security. Please include regular income such as pensions, housing allowance, child allowance, grants for higher education support payments, etc."*

The information from each item is obtain from unfolding bracket questions.

Eurobarometer

"Please count the total wages and salaries per month of all members of this households, all pensions and social benefits; child allowance and any other income like rents, etc... Please indicate the letter of the income group your household falls into ***before tax and*** *. other deductions."*

A. Under $10,000 per year ... F. $70,000 and over per year

Table 2.4: Estimates of the Income Adaptation Model

	Macro					Micro			
$S\bar{W}B_t$	(1)	(2)	(3)	(4)	SWB_{it}	(5)	(6)	(7)	(8)
$ln(GDP_t)$	0.8034	0.5296	1.2899	-0.4093	$ln(y_{it})$	0.0449	0.0637	0.2943**	0.2935**
	(0.8286)	(1.0987)	(2.5943)	(2.0631)		(0.0353)	(0.0438)	(.0266)	(0.0283)
$ln(GDP_{t-1})$	-1.0032	-0.7444	-2.7859	3.151705	$ln(y_{it-1})$	0.0311**	0.0684	-0.0915**	-0.0651**
	(0.8567)	(1.7382)	(2.4308)	(3.1525)		(0.0144)	(0.0452)	(0.0229)	(0.0225)
$ln(GDP_{t-2})$		0.7354		-1.0944	$ln(y_{it-2})$		-0.0334		-0.0268
		(2.0279)		(3.3057)			(0.0538)		(0.0210)
$ln(GDP_{t-3})$		-1.2729		-2.2885	$ln(y_{it-3})$		0.0204		-0.0332
		(2.0284)		(3.0669)			(0.0460)		(0.0216)
$ln(GDP_{t-4})$		0.6309		-1.0376	$ln(y_{it-3})$		-0.0313		-0.0239
		(1.2693)		(1.8976)			(0.0516)		(0.0220)
$Constant$	1.8639	1.0681	14.3664	16.0832		-0.7910*	-0.9123	6.3079**	6.7901**
	(1.1554)	(1.8393)	(3.7267)	(4.3586)		0.3242	(0.5789)	(0.3667)	(0.4253)
$\hat{\gamma}$	1.2488**	1.2293**	2.1599	-3.0999		-0.6925	-0.3776	0.3108**	0.5078**
	(0.2700)	(0.5040)	(2.4885)	(20.1357)		(0.7559)	(0.9980)	(0.0774)	(0.1204)
$f.e.$	No	No	No	No		No	No	Yes	Yes
$Controls$	No	No	No	No		Yes	Yes	Yes	Yes
R^2	0.1552	0.0808	0.6077	0.032					
N	22	19	19	17		286	334	2787	2787
Source	GSS	GSS	GSOEP	GSOEP		GSS	GSS	GSOEP	GSOEP
Data	Avg.	Avg.	Avg.	Avg.		Pseudo-pnl	Pseudo-pnl	Panel	Panel

All specifications include country fixed effects.

Table 2.5: Estimates of the Social Comparison Model

SWB_{it}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$ln(y_{it})$	0.0748**	0.0774**	0.0748**	0.0777**	0.2305**	0.2267**	0.2390**	0.2295**
	(0.0045)	(0.0070)	(0.0042)	(0.0046)	(0.0085)	(0.0269)	(0.0270)	(0.0274)
$ln(GDP_t)$	0.0363			0.4904	3.3303**			3.6648**
	(0.0286)			(0.2576)	(0.3008)			(0.3762)
$ln(Region_t)$		-0.1118**		-0.1328**		1.0337**		0.2214
		(0.0276)		(0.0220)		(0.1921)		(0.2129)
$ln(World_t)$			0.0159	-0.3178			-0.3480	-3.3739**
			(0.0197)	(0.2008)			(0.5683)	(0.6054)
$\tilde{\gamma}$	-0.4858	1.4454**	-0.2125	1.7096***[2]	5.0610**	2.2364*	3.5377**	1.0630**[2]
w/o $f.e.$	(0.3877)	(0.3464)	(0.2680)	(0.2833)	(0.6235)	(1.0707)	(0.2791)	(0.3039)
$\hat{\gamma}$					-14.4492**	-4.5622**	1.4561	-0.9647[2]
with $f.e.$					(2.2232)	(1.0390)	(2.3766)	(0.9412)
Model	Probit	Probit	Probit	Probit	Reg	Reg	Reg	Reg
$f.e.$	No	No	No	No	Yes	Yes	Yes	Yes
$Controls$[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Year	Region	Year	Year	Year	Region	Year	Year
R^2	0.0871	0.0884	0.0879	0.0879	N/A	N/A	N/A	N/A
N	38925	41484	41484	38925	57997	60714	60714	57997
Source	GSS	GSS	GSS	GSS	GSOEP	GSOEP	GSOEP	GSOEP

[1] Controls include all of the available variable among the following list: age, age^2, gender, ethnicity, marital status, employment status, religion, education and number of children.
[2] The γ is estimated with regional income.

CHAPTER III

Happiness and Income Inequality

3.1 Introduction

Well-being measures are receiving increasingly more attention from policy makers, especially in Europe. The British government has ordered a report on "the evidence relating to the causative factors associated with various concepts and components of (personal) well-being". The topic is so popular in England that the University of Sheffield now has a Centre for Well-being in Public Policy, dedicated to studying "how people's health and well-being can be defined, measured and improved in ways that help policy-makers determine the best use of scarce resources".[1]

Views concerning the usefulness of subjective well-being for research vary greatly within the academic community. At one end of the spectrum, some are calling for a paradigm shift, while others express profound scepticism. To better understand what can be learned from happiness research, economists need to understand how subjective well-being relates to income. Economic theory suggests that people derive utility from opportunities and more income typically means more opportunities. If "money doesn't buy happiness", subjective well-being is a very different measure of welfare than income or wealth.

Studying US data, Richard Easterlin was one of the first to note that although at some point in time richer individuals are happier, over time economic growth is not accompanied with an

[1] http://www.shef.ac.uk/cwipp/index.html

increase in aggregate happiness [Easterlin(1974)]. The apparent inconsistency between these two phenomena took his name and is referred to as the Easterlin Paradox. Numerous papers have since explored different explanations to this puzzle with many interpreting it as evidence that classical conceptions of utility need revision. The most popular explanation is that when assessing how happy or satisfied they are with their life, people make comparisons. They compare their own current circumstances with past ones [Rafeal Di Tella and MacCulloch(2004)] and with that of others [Andrew E. Clark and Shields(2008)].

Under the assumption of equivalence between well-being and utility, when individuals derive well-being from having more income than they did in the past, their preferences exhibit income adaptation and when they derive utility from having more income than others, their preferences exhibit social comparisons. Both phenomena find empirical support but they are somewhat challenging to identify [Luttmer(2004)], [Rafeal Di Tella and MacCulloch(2004)]. Measuring income adaptation requires micro-level panels therefore only a few data sources can be used. Measuring social comparison is challenging because the researcher has to construct the reference point of comparison (neighbors, average GDP/capita, hypothetical person, etc.). Furthermore, some of the expected empirical manifestations of these preferences, such as differences in cross and within country well-being-income gradients, are not observed in the data [Stevenson and Wolfers(2008a)].

Interpreting the Easterlin paradox as evidence that peoples' preferences exhibit income adaptation and social comparisons has led many to the conclusion that governments should stop pursuing economic growth and make income taxes more progressive [Layard(2005)]. The idea is that people adapt to growing incomes and that lowering income differences would raise average happiness. When individuals compare themselves to one another, the extra utility someone receives from having a high income comes at the expense of those who compare themselves with him. The pursuit of individual wealth should thus be discouraged by increasing tax rates at the top.

Within the happiness literature, much effort has been targeted at explaining the happiness-income puzzle with the Easterlin paradox almost systematically the starting point of analysis [Andrew E. Clark and Shields(2008)], [Frey and Stutzer(2002)]. Recently Stevenson and Wolfers presented evidence suggesting a positive relationship between GDP growth and average well-being

[Stevenson and Wolfers(2008a)]. More precisely, they found that the income well-being gradient is the same within country, across country and over time. Their findings, they say, "put to rest the claim that economic growth doesn't lead to happiness and (...) undermine the role played by relative income comparisons".[2] Although it varies in strength, evidence that economic growth raises aggregate happiness can be found roughly everywhere outside the US. The authors conclude that "the failure of happiness to rise in the US remains a puzzling outlier". Thus the question: "Why has economic growth not raised average happiness in the US?".

Relying solely on classical economic theory, this paper proposes an explanation of the lack of serial correlation between economic growth and average happiness in the US. The interpretation builds on the concavity of the happiness function and takes into account the evolution of income inequality over the last few decades.[3] When the data is disaggregated by income group, happiness trends observed in the US and elsewhere are consistent with agents whose happiness depends solely on their own income, and not on past income or the income of others.

3.1.1 A simple explanation of the Easterlin Paradox

The lack of growth in aggregate happiness despite the economic growth experienced in the US is not necessarily a paradox. If, as the economy grows, inequality increases in such a way that incomes fall for the poor, the *pull* on average happiness being exerted by the rich will be offset by the *drag* exerted by the poor. Although the income gains of the rich are larger in magnitude than the losses of the poor, average income is growing, the concavity of the function is such that the effects on well-being are similar. Figure 3.1 illustrates this intuition.

This interpretation of the Easterlin paradox builds on the following three propositions.

Proposition 1. *The happiness function is concave.*

Proposition 2. *Real income has risen for the rich and fallen for the poor.*

Proposition 3. *Happiness has risen for the rich and fallen for the poor.*

[2]Most theories of comparisons suggest that the within country income-well-being gradient should be smaller than the across country GDP-average-well-being gradient.

[3]The expression "happiness function" is used to describe the relationship between subjective well-being and income.

The paper shows that each proposition finds empirical support and extends the discussion about the importance of income equality in the conversion of economic growth into aggregate happiness to other countries. The analysis starts with a formal estimation of the curvature of the happiness function. The existence of a satiation point, or plateau, is assessed by examining the relationship between well-being and income among the richest. This is done to test the idea that the happiness-income puzzle reflects the fact that, after a certain point, "money doesn't buy happiness". The paper explores the evolution of the distribution of income and well-being in the US, revealing that real income has indeed fallen for the bottom and second income quintiles. Subjective well-being has followed a pattern similar to income in that the gap between the rich and poor has widened over the last four decades. The rising income gap between individuals at the top of the income distribution and their poorer counterparts over the last 35 years has parallelled an increasing happiness gap. Finally, analyses are conducted with data from Europe to confirm the important role of income inequality in the conversion of economic growth into aggregate well-being.

The second part of the paper explores the possibility that the Easterlin paradox is a result of measurement error. The idea is that even though measured income has been rising, true income may have remained flat, explaining the lack of growth in happiness. The slope of the happiness function is estimated for corrections for taxes and the transitory nature of income.

The paper is organized as follows: Section 4.3 describes the data used for the analysis. Specific descriptions of the subjective well-being and income measures are presented, along with an explanation of the method used for converting the qualitative subjective well-being answers to quantitative information . Section 3.3.1 presents an estimation of the degree of curvature of the happiness function and tests for the existence of a satiation point the well-being. A discussion of the evolution of the income distribution (3.3.2) and the rich-poor happiness gap (3.3.3) in the US follows. Section 3.3.5 uses European data to assess whether patterns observed in other countries confirm the importance of the concavity of the well-being function and income inequality in the conversion of economic growth into general subjective well-being. Section 3.4.1 investigates the

effect of different corrections for the income variable. Finally, Section 3.5 concludes.

3.2 Data

Four sources of data are used in this paper. The General Social Survey (GSS) is a repeated micro-level cross section of about 1600 Americans covering the years from 1972 to 2006 (with some gaps). The Health and Retirement Study (HRS) is a bi-annual panel of roughly 22,000 retired Americans covering the years from 1992 to 2004. The Eurobarometer (EB) is a repeated cross-section of anywhere between 450 and 4250 respondents (averaging at about 1600) from different European nations from 1974 to 2004. The same countries are sampled annually with countries added over time. The German Socio Economic Panel (GSOEP) is an annual panel of about 2750 German adults; it gathers detailed socioeconomic information as well as a life satisfaction measure over a period ranging from 1984 to 2005.

3.2.1 Well-Being

Table 3.1 reports the questionnaire items used to measure subjective well-being in each of the surveys. With the exception of the HRS, the items are somewhat similar. The HRS measures come from answers to a subset of questions from the Center for Epidemiologic Studies of Depression (CES-D), aimed at measuring depressive symptoms. The questions ask "Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true (Yes/No) for you much of the time this past week? Much of the time during the past week you have felt - sad, happy, depressed and enjoyed life".

When estimating the degree of curvature of the happiness function, simply converting the qualitative answers into numbers would not be appropriate because the choice of scale could affect the estimation.[4] For that reason this paper turns to the method used by Stevenson and Wolfers for aggregating well-being scores across groups [Stevenson and Wolfers(2008a)]. The idea is to use the coefficients from ordered probit regressions of subjective well-being on group dummies (with

[4]For example, the GSS is usually coded according to: "Not too Happy"=1, "Pretty Happy"=2 and "Very Happy"=3.

no other controls) as the average well-being for that group. The following makes the procedure explicit.

$$SWB_{it} = \beta_0 + I_{it}\Delta_k + \epsilon_{it}$$

The subscripts i and t denote individuals and time periods. SWB_{it} is the subjective well-being of the respondent. The variable I_{it} is a $n \times k$ matrix of binary group membership indicators and Δ_k is a $k \times 1$ vector of coefficients. The coefficients, δ, are interpreted as well-being indices that capture shifts in an underlying normally distributed latent well-being variable. Unless otherwise specified, the ordered probits are estimated on the entire sample (all years, countries, etc.). Depending on the grouping variables used, the procedure allows for different levels of aggregation, i.e. Δ_k can take different lengths.

δ_{nt} Country×year averages($k = t \times j$)

δ_{jnt} Income groups × countries × year averages ($k = j \times n \times t$)

For the curvature analysis, the groups are either the income categories in the survey or twenty equally weighted bins (each with 5% of the income distribution) used as group dummies if the income variable is continuous, as it is the case in the HRS and GSOEP,. These subjective well-being indices are also employed to present the data graphically.

3.2.2 Income

Table 3.2 reports the wording of the questionnaire items used to collect the information about the respondents' income. The GSOEP and the HRS are the only two sources of data to have non-categorical income measures. The GSS, the WVS and the EB rely on roughly 5 to 15 income categories per country-wave. For these surveys the income variable is converted into a numerical figure by assigning the value that corresponds to the mid-point of the income categories chosen by the respondent. The highest income bracket is converted by adding half of the distance between

the top and bottom bounds of the previous category to the lowest bound of the top category.[5] For most surveys, the income categories do not change annually year but do so relatively frequently, at least once every five years.

For the GSS, a net of tax income measure is obtained using the National Bureau of Economic Research TAXSIM 8 software.[6] The available criteria used for the tax simulation are the year, the number of dependents, the marital status and the respondent's nominal household income.

GDP per capita and CPI, used to convert nominal into real figures, come from the World Penn Tables [of Pennsilvanya(2007)] and the OECD web site [OECD(2007)].

3.3 Analysis

This section provides empirical evidence in support of **Propositions 1, 2** and **3**. The analysis starts by exploring the properties of the well-being function. The evolution of the income and happiness distribution in the US over the last forty years follows. European data is then analyzed to investigate the role of income inequality in the conversion of economic growth into well-being. Finally, formal estimations of the well-being income gradient are reported for different corrections in the measurement of the income variable.

3.3.1 Proposition 1: The Happiness Function

Figures 3.2 through 3.6 present cross-sections of real income and subjective well-being indices for the US, Germany and other European countries. As explained earlier, the SWB indexes come from country-specific ordered probit regressions of happiness on income-group-year membership variables. The index is the coefficient on a respondent's group.

The left hand side figures plot SWB and income on a normal scale and the right hand side figures present SWB and income on a logarithmic scale. Every year for which the data was collected is super-imposed, the x axis is in real figures. The dashed lines plot well-being predicted by a

[5] For example, if the previous to last category is $45,000 to $55,000 and the top category is $55,001 and up, the numerical figure attributed to respondents that chose the top income category is $60,000.

[6] http://www.nber.org/ taxsim/taxsim-calc8/index.html

linear regression of the well-being indices on the logarithm of income (no controls). The shape of the well-being function is remarkably similar across countries. These figures should rule out any doubt about the concavity of the well-being function. In every country and for every well-being measure, the relationship between individual income and well-being is clearly concave. Also, in the US, correcting for taxes (Figure 3c and 3d) eliminates what appears to be a group of very happy poor outliers visible on the raw income figure (3a and 3b).

To formalize the insight that emerges from visual inspection of the figures, the degree of curvature of the well-being function is estimated through a Box-Cox transformation analysis. The procedure estimates

$$SWB_i = \alpha + \beta g(y_i) + \epsilon_i \qquad \text{where} \qquad g(y_i) = (y_i^{\lambda} - 1)/\lambda$$

y_i represent individual i income. The λ captures the degree of curvature of the function. A λ greater than 1 implies a convex function. At exactly 1, the function is linear and for values below 1 the function is increasingly concave. Finally, the function is of the logarithm form when λ equals 0. Figure 3.8 plots $g(y)$ for different λ on a linear and logarithmic scale. Notice that when the underlying function is less concave than the logarithm, it appears convex when plotted on a logarithm scale; the converse is also true.

The second column of Table 3.3 and Table 3.4 report country specific estimates of λ. The estimates confirm the concavity of the well-being function regardless of the country and subjective well-being measure. For the US the well-being function estimated with the GSS data is less concave ($\hat{\lambda} = 0.5$) than that estimated with the HRS data (around 0). This is not due to the fact that income in the GSS does not account for taxes and transfers since the degree of curvature estimated with net income actually suggests a less concave function ($\hat{\lambda} = 0.6$). When income is measured directly (HRS), as opposed to categorically, the degree of curvature of the happiness function estimated in the US is close to zero, the log-linear form.

In Europe, the degree of concavity of the well-being function appears to vary a great deal across countries (second and third column). However, as discussed earlier, this could be due to

differences in tax systems. Estimates of the degree of curvature of the life satisfaction function range from 0.1 (Greece) to 1.3 (Ireland). In all but one country (Belgium), estimates of the degree of curvature of the happiness function are lower (weakly), implying a more concave function, and range from -0.2 (England) to 0.4 (Germany).

The relationship between income and life satisfaction is less concave than the relationship between income and happiness. Differently put, the marginal happiness of a dollar diminishes at a faster rate than the marginal life satisfaction of a dollar. One possible explanation is that the life satisfaction question more explicitly asks respondents to make comparisons when assessing their well-being. Indeed, when respondents focus on other peoples' circumstances; extra income has an important effect on well-being even at high levels. For most functional forms, an increase in income improves an individual's relative position regardless of where he/she is along the income distribution (unless at the top). More generally, the channels linking income and life satisfaction might be different than the channels linking income and happiness. These different properties point to the fact that failing to make a distinction between the two measures may be a mistake. For example, one should be wary of comparisons between a within-country happiness gradient and a across-country life satisfaction gradient.

Satiation

Newspaper articles often suggest that the lack of growth in average happiness is due to the existence of a satiation point in the happiness function, i.e. a level of income above which additional income does not affect happiness [Begley()]. To explore this possibility the effect of income among the very rich is investigated. If the happiness function exhibits satiation, money should not buy happiness for this subpopulation.

The third, fourth and fifth columns of Table 3.3 and Table 3.5 report the smallest top income decile within which income has a statistically significant positive effect on well-being. The tables report the estimated coefficient from ordered probits and the corresponding full-sample estimate. For instance, in the GSS, when raw income is used, the smallest top income group for which income increases happiness is 10%. At 0.393, the income coefficient is actually higher within that

group than among the whole population, 0.239. Using net income does not affect these results. The smallest top groups in the HRS are somewhat larger and the effect of income is smaller in those groups. Looking at the figures (3.2 and 3.3) reveals that a large number of middle income earners report being "highly happy" for three of the four HRS well-being measures . Additionally, out of all four, "Feeling depressed" is the well-being indicator that behaves most like the GSS happiness question. The results are very similar in Europe, where income raises well-being even among the top 10% richest These results are shown in Table 3.5.

The well-being function is clearly concave and there is no evidence of satiation as the well-being function is positively sloped even among top earners. **Proposition 1** is confirmed. Furthermore, using a log-linear function to capture the concavity of the relationship between individual well-being and income, as is the norm in the field, is a valid choice since it corresponds to the degree of parametrically estimated concavity. This specific form implies that proportional income gains bring the same well-being gain regardless of one's position on the income distribution. Money buys happiness but, it gets more expensive as people get richer.

3.3.2 Proposition 2: Income Inequality

Panel (a) of Figure 3.9 shows the evolution of real income for each quintile of the US General Social Survey. Income inequality has grown among the GSS respondents over the last four decades. Real income for the bottom and second quintiles has decreased by an average of 0.58% and 0.55% a year respectively. Real income for the third, fourth and top quintiles has increased by an average of 0.15%, 0.79% and 0.90% a year respectively. The gap between the 1^{st} and 5^{th} quintile has thus grown by about 1.5% per year. While the average income of the top quintile was about 9 times larger than that of the bottom's in 1973 it was close to 10.5 times larger by the end of 2006 . The income patterns in the GSS support **Proposition 2**. Furthermore, because it is conducted with income measured with categorical questions, the analysis most likely underestimates the magnitude of the rise in income inequality.

3.3.3 Proposition 3: The Happiness Gap

Panel (b) of Figure 3.9 reports the happiness for each quintile of the GSS since 1973. Happiness has polarized over the years, decreasing for the bottom quintiles and stagnating for the top quintiles. Figure 3.10 presents the evolution of the percentage of respondents answering "Very Happy", "Pretty Happy" and "Not too Happy" for each income group. The figure shows that the proportion of the poorest respondents reporting to be "Very Happy" dropped for every income quintile over the last four decades. The proportion of richest respondent reporting to be "Unhappy" has also dropped over the same period. Interestingly, the frequency of "Very Happy" answers has dropped while the frequency of "Happy" has risen for every income group since the mid-seventies. The happiness gap between the rich and poor has widened because the *switch* from "Very Happy" to "Happy" has been more drastic for the poorer income groups.

To get a sense of the magnitude of the widening of the happiness gap, Table 3.6 reports estimates from four different specification of the following ordered probit:

$$\begin{aligned} SWB_{it} &= \beta_0 + \beta_P Poor_{it} + \beta_M Mid_{it} + \beta_X Controls_{it} \\ &\quad + \beta_{PT}(Poor \times Time) + \beta_{MT}(Mid \times Time) + \beta_{RT}(Rich \times Time) + \epsilon_{it} \end{aligned}$$

where $Poor_{it}$, Mid_{it} and $Rich_{it}$ are mutually exclusive group dummies representing the membership of respondent i to the bottom, middle three or top income quintiles in period t. β_P and β_M capture the difference in happiness between the corresponding group and the rich in 1973. The coefficients on the $(Group \times Time)$ variables, β_{PT}, β_{MT} and β_{RT} reflect the average annual change in happiness for each group. $Controls_{it}$ include the respondent's age, gender, ethnicity, marital status and education.

To help with the interpretation, column (4) is discussed in detail; this specification includes the sociodemographic controls. As captured by $\hat{\beta}_P$, the happiness gap between the rich and poor in 1973 was 60% of one standard deviation. This difference grew by 0.44% every year ($\hat{\beta}_{PT}$) to reach 74.5% by the end of 2006 ($\hat{\beta}_{PT} \times 33$ years). The happiness gap between the top and bottom

income quintile has grown by 14.5% of one standard deviation over that period.[7] Said differently, the happiness difference between the bottom 20% poorest and the top 20% richest is 25% larger in 2003 than it was in 1975. During the same period, the income gap between these groups rose by 0.4 standard deviations.

The estimated happiness gap between the middle and rich income group($\hat{\beta}_M$) was 21.73% of one standard deviation in 1973. It grew by 0.39% ($\hat{\beta}_{MT}$) every year to reach 34.6% of a standard deviation in 2006 ($\hat{\beta}_{MT} \times 33$ years), a 12.9% increase. Notice that the gap between the middle and bottom quintiles remained roughly constant over that period since the well-being of both groups decreased at a similar rate.

The widening of the happiness gap is confirmed. It is not attributable to changes in the composition of the quintiles since the exclusion of controls does not affect the results. In the US, happiness has fallen for the poor and middle income groups and stagnated for the rich (**Proposition 3** is confirmed). Stevenson and Wolfers discuss the fall in overall variance in happiness since the mid-seventies and interpret this decline as a decline in happiness inequality [Stevenson and Wolfers(2008b)]. In light of the facts that the happiness of the poor has fallen and the gap between the rich and poor has widened this interpretation appears misleading. Indeed, both in relative and absolute terms, poor people are less happy today than they were in the seventies.

3.3.4 The Easterlin Paradox Revisited

The idea that the happiness income puzzle can be explained solely by the concavity of the happiness function and the evolution of incomes finds support in the data. 1) The happiness function is concave. 2) Income inequality has increased since the mid seventies and real income has fallen for the poorest two quintiles. 3) Happiness tracks income changes along a concave function, well-being has stagnated for the rich and dropped for the poor. The following subsection investigates the role of income inequality in the conversion of economic growth into aggregate well-being in other countries to further validate this reading of the happiness income puzzle.

[7] The ordered probit normalizes the standard deviation to one.

3.3.5 The Happiness-Income Puzzle in Europe

Table 3.8 and 3.9 report estimates of the rich poor well-being gap and its evolution for each country. The bottom rows of the table report the evolution of the well-being gap over time. GDP per capita increased in all countries during the time of the survey. These regressions are country specific and include year dummies as well as a set of controls for age, ethnicity, gender, marital status and education. The interpretation of the coefficients is the same as that of Table 3.6.

In countries where income inequality has either fallen or remained constant, average life satisfaction has risen on par with GDP per capita. This is the case in France, Germany, Italy, Luxembourg, Denmark, and Spain. In Holland and Great Britain, average life satisfaction has risen despite rising income inequality. This is not inconsistent with the interpretation of the Easterlin paradox put forward in this paper.[8] Portugal displays patterns similar to the US. In both countries, aggregate well-being stagnated (failed) despite a growing economy. In that sense, the Easterlin paradox is not exclusively an American phenomenon.

In all but one country (Belgium), economic growth was accompanied by an (weak) increase in the rich-poor well-being gap. This should be regarded as a stylized characteristic of the relationship between subjective well-being and income over time.

Table 3.10 reports estimates of country-level life satisfaction regressions. Column (1) estimates the effect of the logarithm of GDP per capita on aggregate life satisfaction. The gradient is positive and significant at 0.183. The second specification (2) looks at the effect of the average logarithm of income which captures changes in the income distribution not captured by average income. The gradient for this estimation is roughly half of the ln(GDP) coefficient at 0.096. However, when the estimation includes both variables (Column 3), only the average log-income remains significantly linked to aggregate well-being, confirming the role of income inequality in the conversion of economic growth into aggregate well-being. Overall, the patterns in Europe are consistent with the notion that aggregate well-being is driven by individual income.

[8] As long as the whole income distribution benefits from the economic growth (i.e. real incomes do not fall for the poor) average well-being will rise despite increasing income inequality. Furthermore, even if real incomes fall for the poor, average well-being will rise if the well-being gains of the rich is larger than the well-being loses of the poor.

3.4 Discussion

3.4.1 Taxes and Permanent Income

Another explanation of the happiness-income puzzle is that the lack of growth in average happiness as a function of income reflects the fact that income is improperly measured. The idea is that although measured income has risen substantially since the seventies, true income has not. This section looks at whether correcting for taxes and the transitory nature of income affects the relationship between income and subjective well-being.

Table 3.7 reports estimates from ordered probit regressions of subjective well-being on different income measures. The estimation uses data from the GSS and from the GSOEP. Note that while the GSS well-being measure asks about the respondent's happiness the GSOEP measure asks about life satisfaction. The log-linear form is assumed for these estimations.

Column (1) reports the estimated happiness-income gradient from an ordered probit of well-being on raw income in the US. Column (2) presents the same specification using net income computed with TAXSIM8. Both specifications include year dummies and controls for age, marital status, gender and race. Under the assumption that happiness, like utility, depends on disposable income, one would expect net income to have a larger effect on well-being. This is indeed the case; the coefficient is 0.15 for raw income and 0.16 for net income. Although the coefficients are statistically different the difference is minimal. Column (3) reports the same coefficient using data from Germany, with life satisfaction as the well-being variable. The income well-being gradient is higher in this case but since both the sample and well-being measure are different across the countries, discussion will be limited to within country comparisons. Column (4) presents the estimate obtained with a fixed-effect model. This model does not affect the gradient substantially.

Column (5) uses lagged income to proxy for permanent income to test the hypothesis that well-being, like utility, depends not on transitory income but permanent income. The argument as to why lagged income is a proper instrument for permanent income is detailed in the Appendix. Succinctly put, the only part of lagged income that is related to contemporaneous well-being is the permanent part, this is not the case for contemporaneous income. This correction actually

lowers the well-being-income gradient (0.221). The fact that unlike utility, well-being depends on transitory income, could be interpreted as evidence that well-being does not measure utility. Overall, the Easterlin paradox does not appear to be a result of mismeasurement of income.

3.4.2 Income Adaptation and Social Comparison

The interpretation of the Easterlin paradox presented in this paper does not rule out the possibility that individual preferences exhibit income adaptation or social comparison. It does however call into question the stylized facts that have motivated most discussions of these phenomena in happiness research as well as the notion that aggregate happiness data is informative of individual preferences. There is evidence that individuals compare their circumstances with that of others and get accustomed to changes in their lives [Frey and Stutzer(2002)]. Whether these phenomena have an economically important effect at the macroeconomic level is unclear.

Research on hedonic adaptation suggests that people adapt to new circumstances very rapidly. Kimball, Ohtake, and Tsutsui find that the type of adaptation described by psychologists takes place over very short periods of time [Miles Kimball and Tsutsui(2006)]. Kimball and Silverman find, for example, that widows adapt to the loss of their partner in about nine months [Kimball and Silverman(2008)]. The type of adaptation described by psychologists and studied by the authors does not seem to be the mechanism at work in the behavior of long run happiness.

Research on social comparison suggests that people compare themselves to people who are geographically close to them [Barrington-Leigh and Helliwell(2008)]. One implication is that the well-being income gradient should be smaller for cross-country than for within-country regressions. When individuals derive utility from comparisons with people living in their own country, regressions are driven not by between-country variations but by within-country variations. In fact, if agents only care about where they rank in their country, there should be no positive association between a nation's GDP per capita and the average level of subjective well-being. Stevenson and Wolfers could not reject the hypothesis that the within and between-country gradients are equal [Stevenson and Wolfers(2008a)]. This paper investigated the possibility that this is due to errors in the measurement of income and found that it is not the case.

3.5 Conclusion

This paper presents the Easterlin paradox under a new light. It argues that the assumption of equivalence between happiness and utility does not necessarily lead to the conclusion that peoples' preferences are different than what standard notions of utility suggest. Like the utility function described in introductory economics courses, the relationship between income and subjective well-being is concave. Whether this should be interpreted as evidence that subjective well-being captures utility is an open question.

The lack of growth in aggregate happiness despite massive economic growth reflects the fact that, over the last few decades, income gains have accrued to the top income earners to such a disproportionate extent that income has fallen for the poor. Over the last thirty-five years the happiness gap between the rich and the poor has widened in pair with income inequality. Regardless of the reason given, happiness is nowadays more a commodity of rich people than it was thirty-five years ago. Analysis of patterns in European countries confirm the crucial role of income inequality in the conversion of economic growth into aggregate well-being. The increased well-being gap between the rich and poor has widened in other developed countries. It appears that this fact should receive additional attention and be consider as a stylized fact of the relationship between income and happiness. Correcting for taxes has little effect on the estimated slope of the happiness function and using permanent rather than transitory income surprisingly lowers the gradient.

The conclusions reached in this paper extend naturally to those reached in other fields of economics: income equality matters. Whether it is because people compare themselves to each other or because the happiness function is concave, the income distribution affects how resources are converted into well-being. Raising national happiness with policies aimed at accelerating the economic development of a country is not ineffective if the expansion benefits the entire income distribution.

On a theoretical level, economists understand how utility relates to income. Bridging the gap between theory and practice can be a difficult task as utility per se is not measurable. Economists

have partly resolved this issue by studying peoples' choices but choices are only informative of preferences; they do not allow for comparisons across individuals. For many, this is precisely the appeal of happiness data. This paper attempts to inform the debate about the relationship between happiness and utility by exploring an alternative interpretation of the stylized facts of happiness research.

More work is needed before economists can clearly understand the relationship between subjective well-being and utility. Few studies have investigated the production of happiness. An agent's time allocation is paramount to his welfare. Furthermore, knowing that time is an important input for happiness opens the door to a promising area of research.

APPENDIX

Permanent Income

Lagged income (Y_{t-1}) can be used as a proxy for permanent income (Y_t^P). Under the permanent income hypothesis, observed income (Y_t) has a permanent (Y_t^P) and transitory (Y_t^T) component. A consumers' utility depends on permanent income.

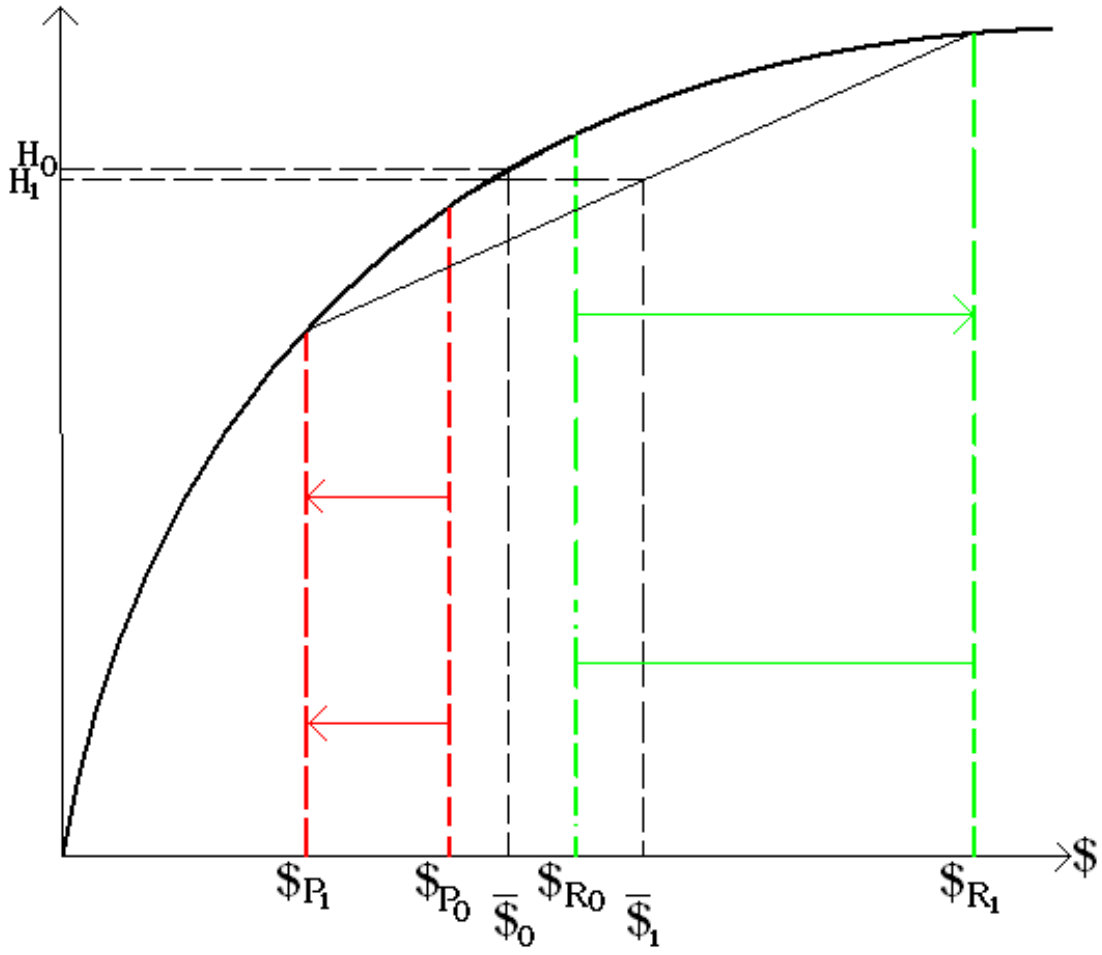
$$\begin{aligned} Y_t &= Y_t^T + Y_t^P \\ Y_{t-1} &= Y_{t-1}^T + Y_{t-1}^P \end{aligned}$$

The correlation between Y_t and H_t does not isolate the effect of permanent income on happiness. However, if income follows a random walk, the only part of lagged income related to contemporaneous well-being is the permanent part, it can thus serve as a proxy for Y_t^P.

$$Cov(Y_{t-1}^P, Y_t^P) > 0, \quad Cov(Y_t^T, Y_t^P) = 0, \quad Cov(Y_{t-1}^T, Y_{t-1}^P) = 0 \quad \text{and} \quad Cov(Y_t^T, Y_{t-1}^T) = 0$$

$$\frac{Cov(Y_{t-1}, H_t)}{Cov(Y_{t-1}, Y_t)} \simeq \frac{Cov(Y_{t-1}^P, H_t)}{Cov(Y_{t-1}^P, Y_t^P)}$$

Figure 3.1: Economic Growth and Falling Average Happiness.



Note: The Figure illustrates the happiness of two individuals, with the same concave utility function, who's happiness changes across two periods as a result of changes in their income. The result is an overall increase in average income and a drop in average happiness.

Figure 3.2: The Well-Being Function in the US General Social Survey.

(a) Happiness and Income

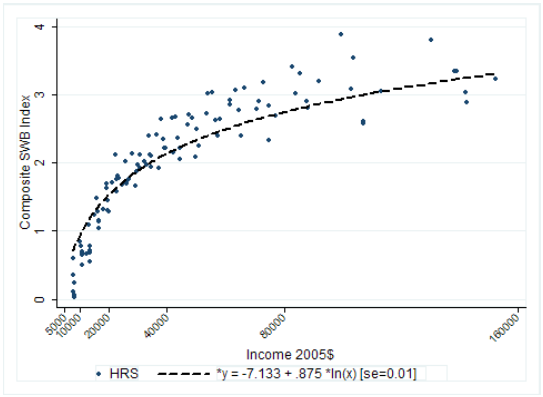
(b) Happiness and log(Income)

(c) Happiness and Net Income

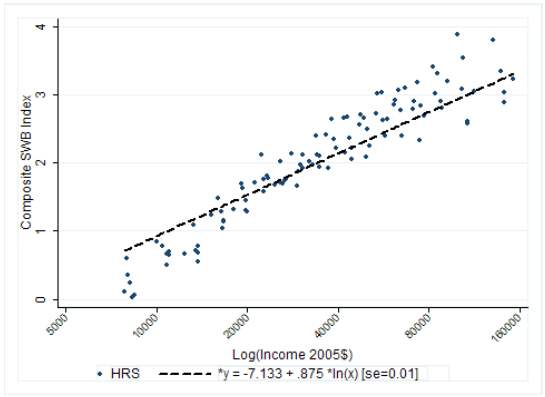
(d) Happiness and log(Net Income)

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

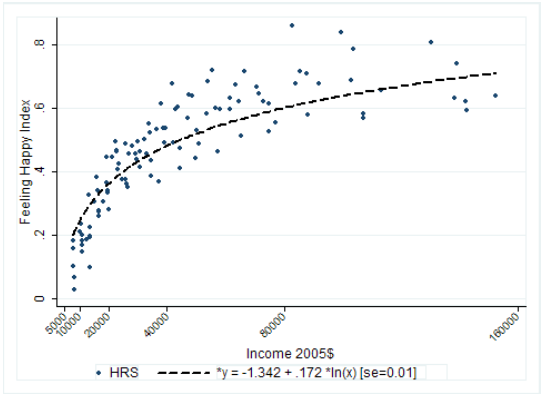
Figure 3.3: The Well-Being Function in the US Health and Retirement Study (A).



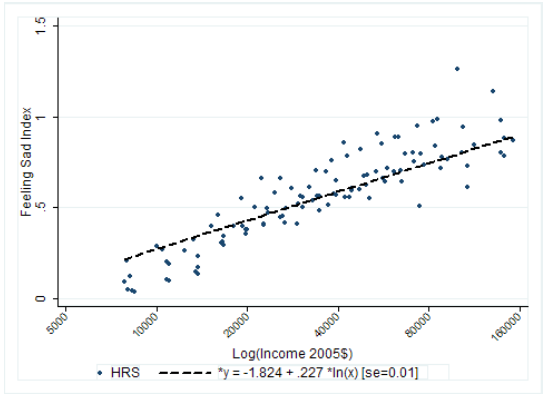
(a) Composite Well-Being



(b) Composite Well-Being/log



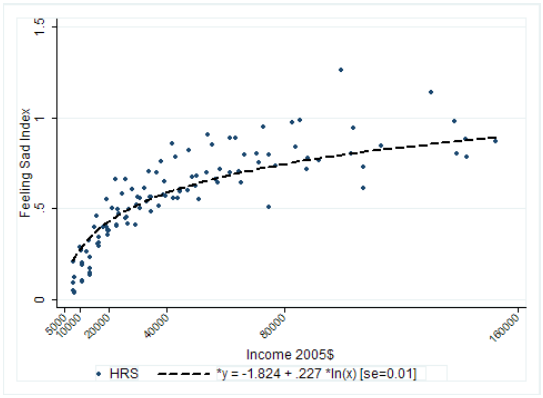
(c) Feeling Happy



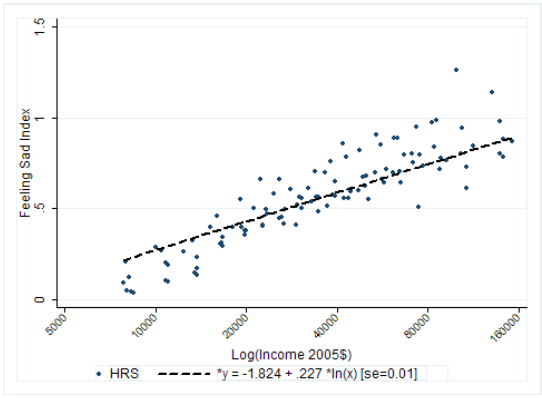
(d) Feeling Happy/log

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

Figure 3.4: The Well-Being Function US Health and Retirement Study (B).

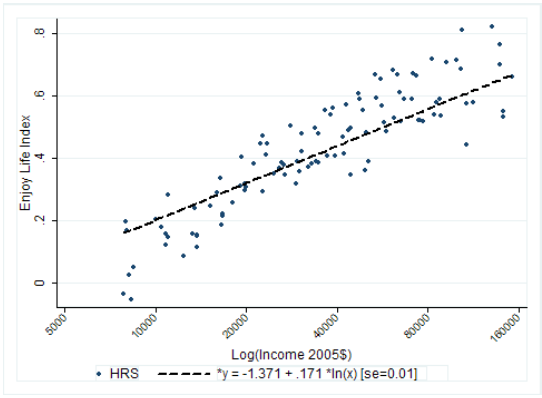


(a) Feeling Sad



(b) Feeling Sad/log

(c) Enjoy Life



(d) Enjoy Life/log

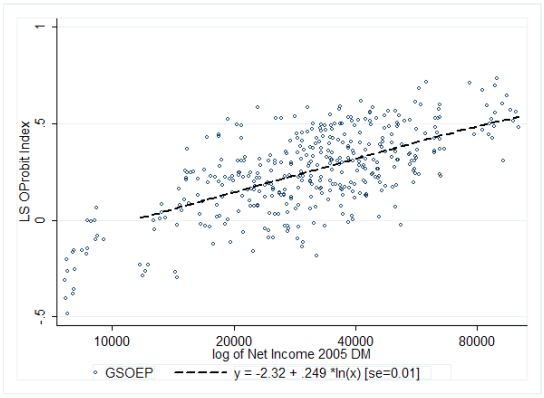
(e) Feeling Depressed

(f) Feeling Depressed/log

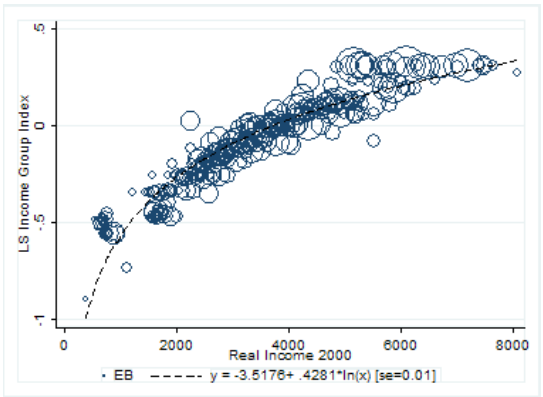
Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

Figure 3.5: The Well-Being Function in West Germany.

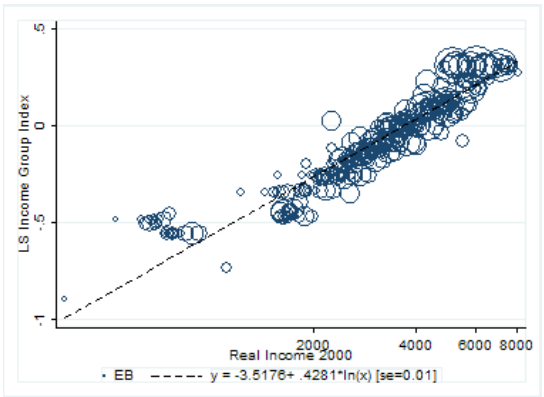
(a) Life Satisfaction (GSOEP)



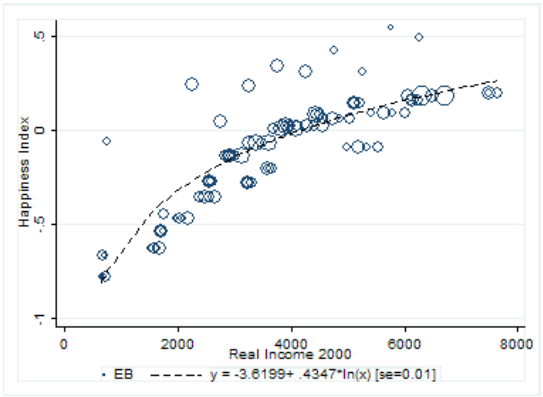
(b) Life Satisfaction/log (GSOEP)



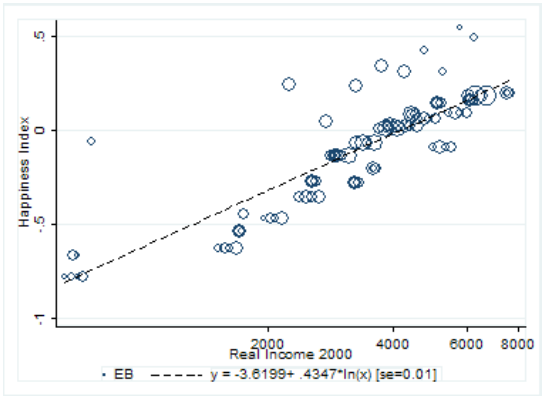
(c) Life Satisfaction (EB)



(d) Life Satisfaction/log (EB)



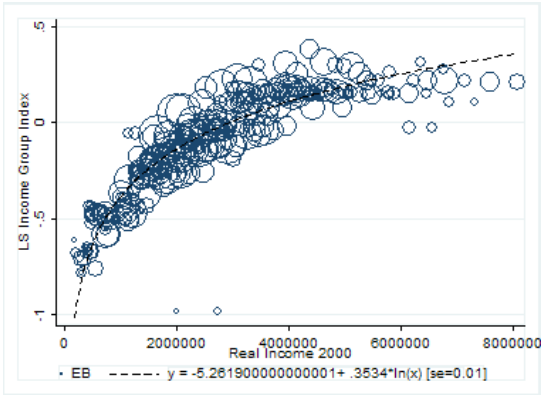
(e) Happiness (EB)



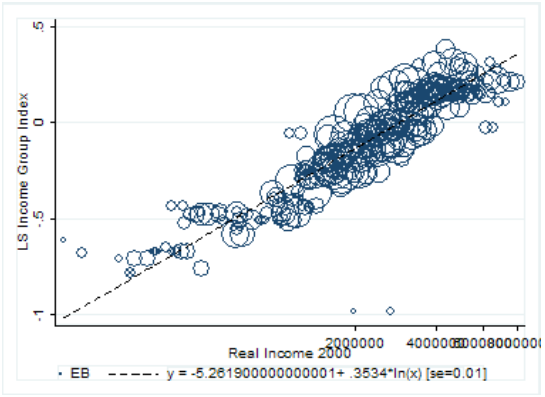
(f) Happiness/log (EB)

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

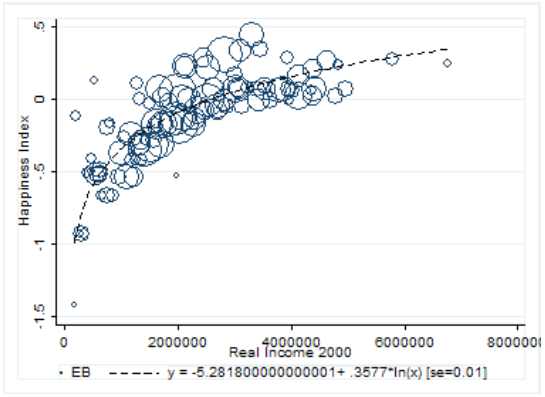
Figure 3.6: The Well-Being Function in Europe (A).



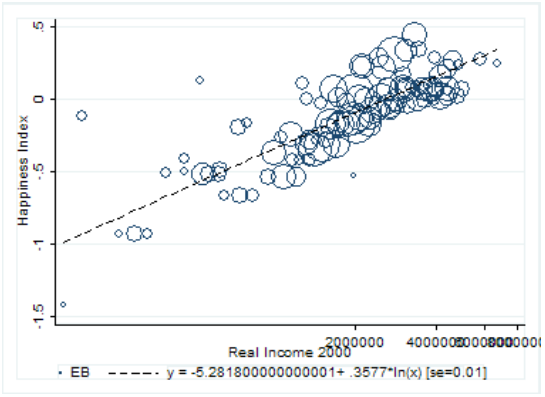
(a) Italy (LS)



(b) Italy (LS)/log



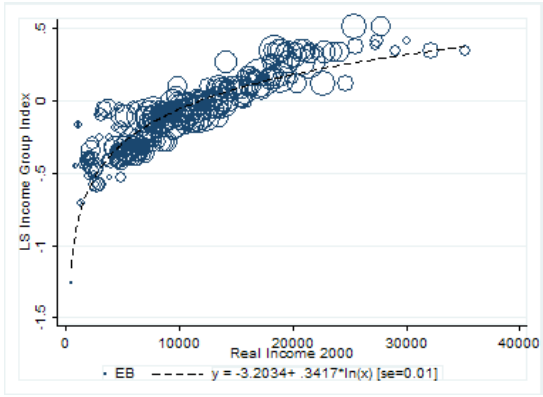
(c) Italy (H)



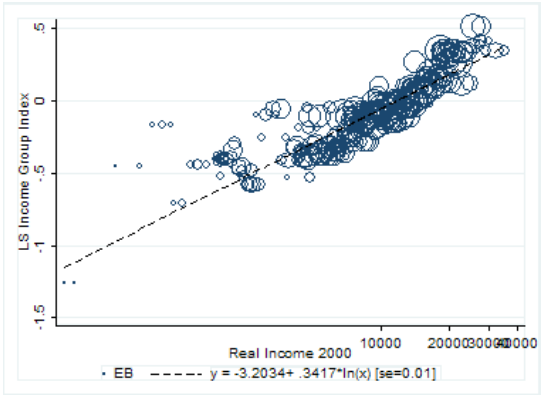
(d) Italy (H)/log

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

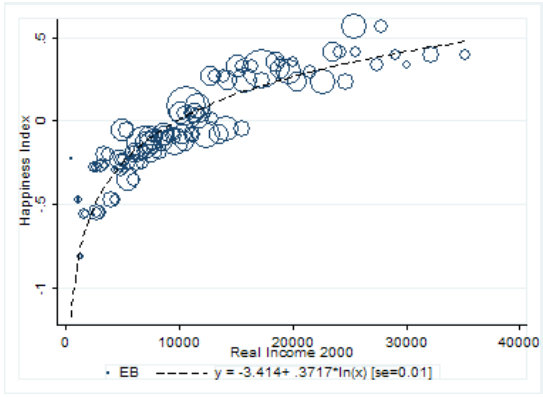
Figure 3.7: The Well-Being Function in Europe (B).



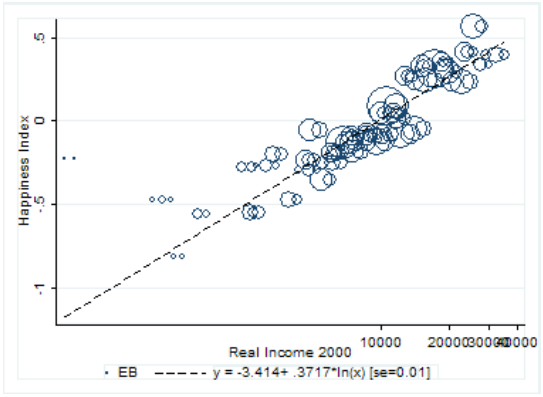
(a) France (LS)



(b) France (LS)/log



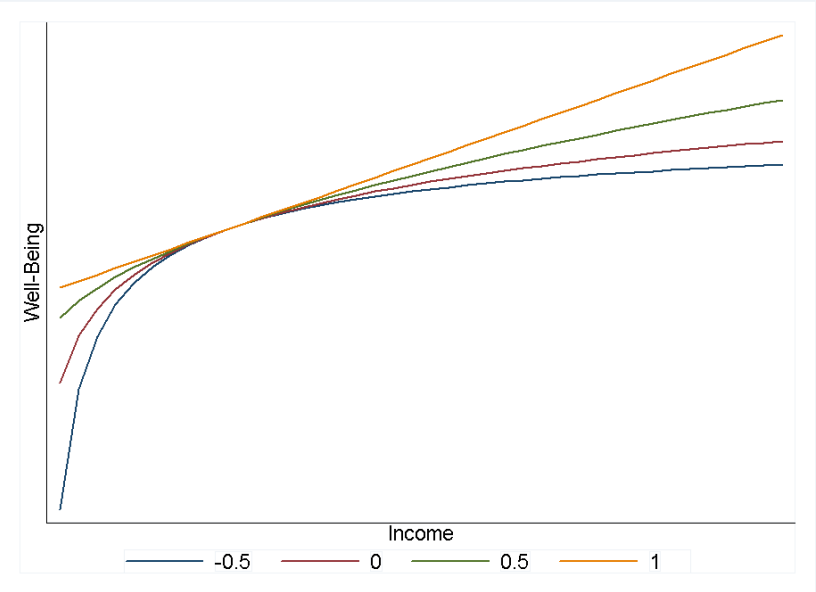
(c) France (H)



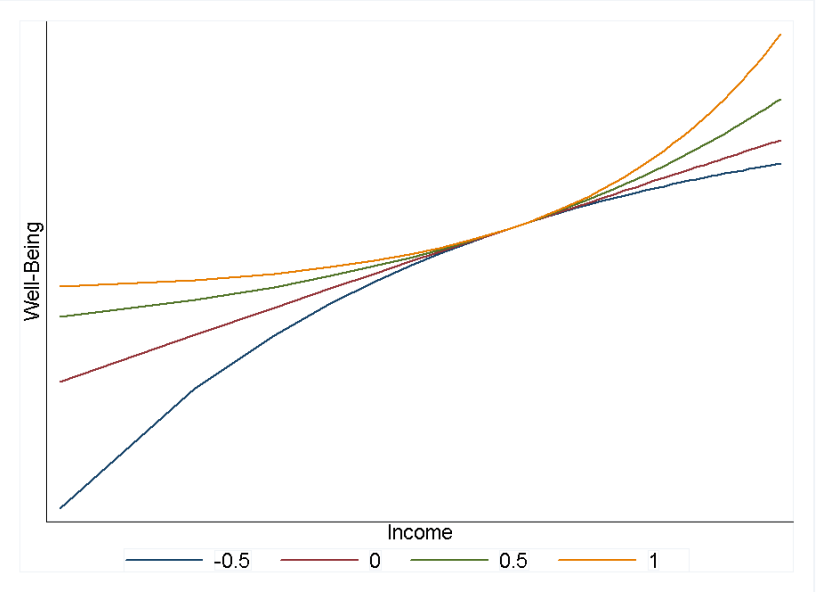
(d) France (H)/log

Note: Figure displays the coefficients of an ordered probit regression of well-being on income-group-year dummies.

Figure 3.8: Curvature Profile for Different λ.



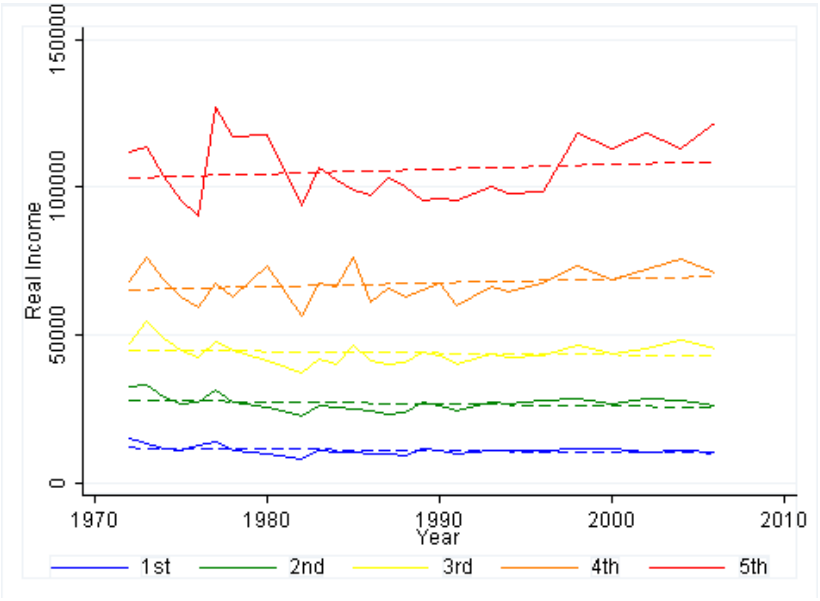
(a) Linear Scale



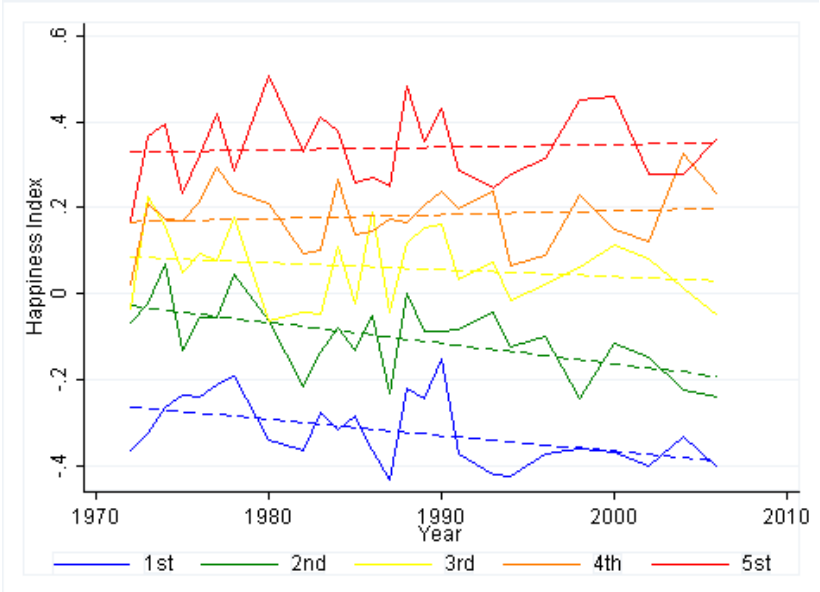
(b) log Scale

Note: Figure shows the effect of λ on $y = (x^{\lambda} - 1)/\lambda$ on a linear and a log scale.

Figure 3.9: Incomes of the Quintiles in the **US**.



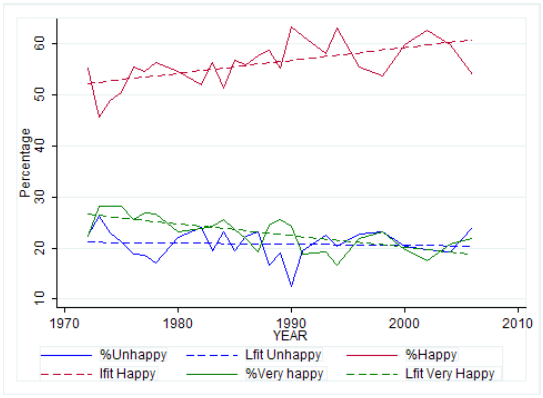
(a) Real Income



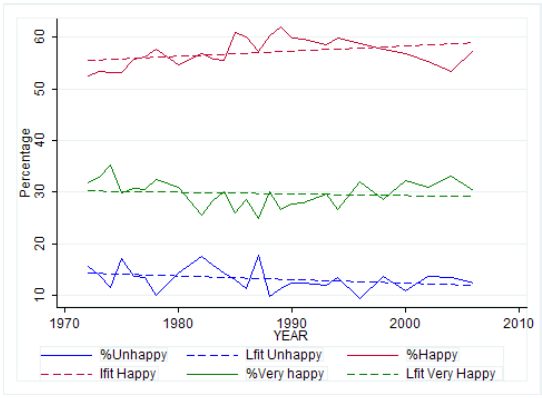
(b) Happiness

Note: Figure shows the trajectories of Real income and Happiness for each quitiles.

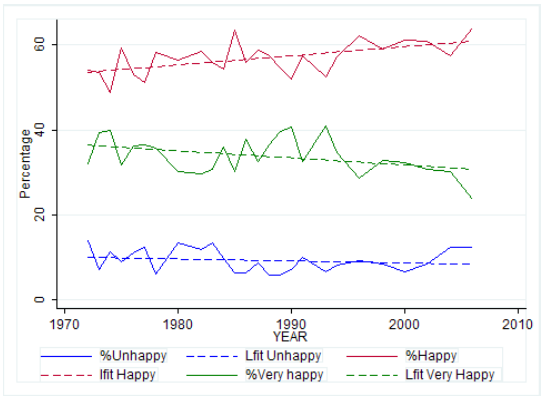
Figure 3.10: Evolution of the Distribution of Answers for Each Income Quintile of the GSS (**US**)



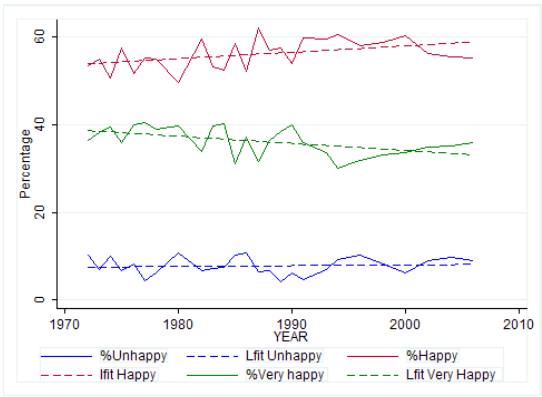
(a) Bottom Quintile



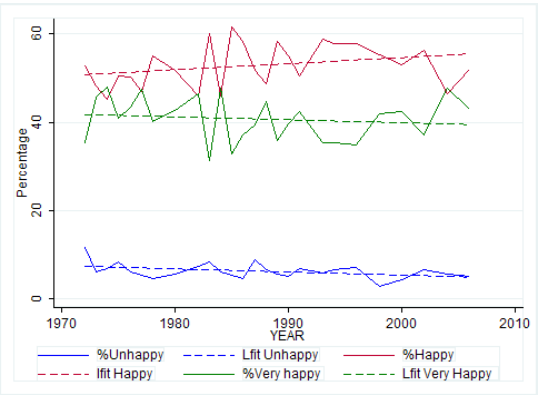
(b) 2nd Quintile



(c) 3rd Quintile



(d) 4th Quintile



(e) Top Quintile

Note: Figure shows the % of respondent choosing each answer over time for each quitiles.

Table 3.1: Well-being Questions from Different Data Sources.

General Social Survey

"Taken all together, how would you say things are these days would you say that you are:"
1. Very Happy 2. Pretty Happy 3. Not too Happy

Health and Retirement Study

"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of the time this past week."
Felt depressed / Was happy / Felt sad / Enjoyed life.

Eurobarometer

Happiness
"Taking all things together, how would you say things are these days - would you say you're: "
1. Very Happy 2. Pretty Happy 3. Not too Happy

Life Satisfaction
"Please tell me whether you are _____ with your life in general?"
1. Very satisfied 2. Fairly satisfied 3. Not very satisfied 4. Not at all satisfied

German Socio Economic Panel

"In conclusion, we would like to ask you about your satisfaction with your life in general."
0. Completely dissatisfied (...) 10. Completely satisfied

Table 3.2: Income Questions from Different Data Sources.

German Socio Economic Panel

"If you take a look at the total income from all members of the household: how high is the monthly household income today?" Please state the ***net monthly income****, which means after deductions for taxes and social security. Please include regular income such as pensions, housing allowance, child allowance, grants for higher education support payments, etc."*

Health and Retirement Study

The income variable, HwITOT, is the sum of all income in household, that is, the sum of the respondent and his spouse earned income, capital gains income, pension and annuities, Social Security payments, unemployment and worker's compensation, income from Veteran's benefits, welfare, and food stamps, alimony, other income, lump sums from insurance, pension and inheritance."

The information from each item is obtain from unfolding bracket questions.

Eurobarometer

"Please count the total wages and salaries per month of all members of this households, all pensions and social benefits; child allowance and any other income like rents, etc... Please indicate the letter of the income group your household falls into ***before tax and*** *. other deductions."*

A. Under $10,000 per year ... F. $70,000 and over per year

General Social Survey

"In which of these groups did your total family income, from all sources, fall last year ***before taxes****, that is? Just tell me the letter."*

A. Under $1,000 ... Y. $150,000 or over

Table 3.3: The Well-Being Function in the US.

SWB measure	λ^1	Smallest top %[2]	$\hat{\beta}_{Top}$	$\hat{\beta}_{Full}$	Income	Source
Happiness	0.5143	90^{th}	0.393	0.238	Pre-Tax	GSS
	(0.049)		(0.083)	(0.007)		
Happiness	0.6112	90^{th}	0.430	0.262	Net	GSS
	(0.055)		(0.078)	(0.007)		
Feeling Happy	-0.0117	60^{th}	0.040	0.171	Net	HRS
	(0.0012)		(0.015)	(0.005)		
Enjoy Life	-0.0070	60^{th}	0.059	0.170	Net	HRS
	(0.0012)		(0.018)	(0.005)		
Feeling Sad	0.0116	70^{th}	0.050	0.204	Net	HRS
	(0.0012)		(0.014)	(0.004)		
Feeling Depressed	0.0594	95^{th}	0.106	0.280	Net	HRS
	(0.0009)		(0.037)	(0.005)		
CUmulative Score	0.0181	95^{th}	0.106	0.280	Net	HRS
	(0.0010)		(0.037)	(0.005)		

[1] λ provides the best fit for $SWB_{it} = (y_{it}^{\lambda} - 1)/\lambda$, where y is income.

[2] The table reports the smallest group at the top of the income distribution within which $ln(income)$ is significantly associated with well-being. The coefficients estimated within the group and with the full sample including demographic controls.

Table 3.4: Curvature Estimates of the Happiness Function for Europe.

	$\hat{\lambda}_{LS}$		$\hat{\lambda}_{H}$	Income	$\bar{N}$	Time Span	Source
France	0.4772	$=$	0.4480	Pre-Tax	291	1975-02/86	EB
	(0.1012)		(0.1334)				
Belgium	0.1221	$<$	0.2667	Pre-Tax	278	1975-02/86	EB
	(0.1318)		(0.2062)				
Netherlands	0.9894	$>$	0.2366	Pre-Tax	310	1975-02/86	EB
	(0.1338)		(0.2520)				
Germany-West	0.4941	$>$	0.3603	Pre-Tax	291	1975-02/86	EB
	(0.1195)		(0.1644)				
Italy	0.2209	$>$	-0.0391	Pre-Tax	291	1975-02/86	EB
	(0.0851)		(0.1418)				
Denmark	0.9157	$>$	0.1013	Pre-Tax	246	1975-02/86	EB
	(0.1462)		(0.2135)				
Ireland	1.3234	$>$	0.2555	Pre-Tax	272	1975-02/86	EB
	(0.2201)		(0.2352)				
Great Britain	0.4980	$>$	-0.1916	Pre-Tax	300	1975-02/86	EB
	(0.1039)		(0.2169)				
Greece	0.1014	$=$	0.0886	Pre-Tax	255	1975-02/86	EB
	(0.0765)		(0.2094)				
Germany-West	-0.1531			Net	2,788	1984-05	GSOEP
	(0.4362)						

[1] The estimation finds λ that provides the best fit for $SWB_{it} = (y_{it}^{\lambda} - 1)/\lambda$,
where y is income.
The $=$, $>$ and $<$ signs indicate how the coefficient statistically relate to each other.

Table 3.5: Satiation test of the Well-Being Function for Europe.

Country	Smallest top %[1]	$\hat{\beta}$ top	$\hat{\beta}$ Full Sample	Smallest top %[1]	$\hat{\beta}$ top	$\hat{\beta}$ Full Sample
		Happiness			Life Satisfaction	
France	80^{th}	0.387	0.371	80^{th}	0.561	0.338
		(0.087)	(0.017)		(0.068)	(0.010)
Belgium	90^{th}	0.495	0.347	90^{th}	0.221	0.154
		(0.181)	(0.019)		(0.083)	(0.011)
Netherlands	70^{th}	0.297	0.316	90^{th}	0.693	0.349
		(0.097)	(0.020)		(0.161)	(0.011)
Italy	70^{th}	0.210	0.397	90^{th}	0.556	0.420
		(0.079)	(0.020)		(0.070)	(0.011)
Luxembourg	70^{th}	0.287	0.328	80^{th}	0.351	0.388
		(0.139)	(0.039)		(0.122)	(0.020)
Denmark	50^{th}	0.125	0.097	90^{th}	0.478	0.201
		(0.048)	(0.013)		(0.124)	(0.008)
Ireland	60^{th}	0.166	0.190	90^{th}	0.179	0.223
		(0.072)	(0.020)		(0.081)	(0.012)
Great-Britain	60^{th}	0.231	0.154	90^{th}	0.206	0.259
		(0.053)	(0.015)		(0.106)	(0.008)
Greece	70^{th}	0.152	0.176	90^{th}	0.187	0.3053
		(0.069)	(0.022)		(0.062)	(0.010)
Germany	70^{th}	0.338	0.457	80^{th}	0.444	0.440
		(0.130)	(0.025)		(0.099)	(0.012)
Germany		GSOEP		95^{th}	0.206	0.254
					(0.068)	(0.028)

[1] The table reports the smallest group at the top of the income distribution within which $ln(income)$ is significantly associated with well-being. The coefficients estimated within the group and with the full sample are reported.

Table 3.6: Trends in the Rich-Poor Gap in the US (GSS).

	(1)	(2)	(3)	(4)
Poor	-0.5780***	-0.4648***	-0.1834***	-0.6018***
	(0.0374)	(0.0385)	(0.0469)	(0.0388)
Mid	-0.2377***	-0.2310***	-0.0873***	-0.2173***
	(0.0319)	(0.0321)	(0.0336)	(0.0322)
Poor Time Trend	-0.0038***	0.0008	-0.0025**	-0.0044***
	(0.0012)	(0.0012)	(0.0012)	(0.0012)
Middle Time Trend	-0.0021***	0.0025***	-0.0022***	-0.0039***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Rich Time Trend	0.0016	0.0029**	0.0011	-0.0001
	(0.0014)	(0.0014)	(0.0014)	(0.0015)
$ln(RealIncome)$			0.1745***	
			(0.0124)	
Controls[1]	No	Yes	No	Yes
Education[2]	No	No	No	Yes
Pseudo R^2	0.0174	0.0418	0.0203	0.0219
N	41795	41727	41795	41631

[1] Controls include the respondent's age, its square, its ethnicity (black, white or other) and his marital status.
[2] Education is accounted for by the highest degree achieved (Less then High-School, High-School, Bachelor or Graduate).

Table 3.7: Individual Income and Happiness in the US and Germany.

	(1)	(2)	(3)	(4)	(5)
ln(Income)	0.1465***				
	(0.0079)				
ln(Net Income)		0.1565***	0.2427***	0.2569***	
		(0.0089)	(0.0090)	(0.0258)	
ln(Net Income$_{t-1}$)					0.1949***
					(0.0091)
Year dummies	Yes	Yes	Yes	Yes	Yes
Controls [1]	Yes	Yes	Yes	No	Yes
(Pseudo)R^2	0.0450	0.0450	0.0107	0.0155	0.0083
Fixed Effects	No	No	No	Yes[2]	No
N	41727	41635	60714	61169	57934
Source	GSS	GSS	GSOEP	GSOEP	GSOEP

[1] Controls include age, age^2, marital status, gender, race and education.
[2] Linear regression, SWB score converted with a linear scheme (Very Satisfied=10 , ..., Very Unsatisfied=0)

Table 3.8: Life Satisfaction and Income Inequality trends in Europe (EB-A).

	France	Belgium	Holland	Germany	Italy	Luxembourg	Denmark	Ireland
$Poor$	-0.6704***	-0.5655***	-0.5208***	-0.4415***	-0.5668***	-0.5056***	-0.5596***	-0.5755***
	(0.0355)	(0.0377)	(0.0359)	(0.0344)	(0.0334)	(0.0797)	(0.0449)	(0.0442)
Mid	-0.4118***	-0.1943***	-0.3104***	-0.1195***	-0.1699***	-0.0712	-0.2896***	-0.2818***
	(0.0321)	(0.0328)	(0.0316)	(0.0310)	(0.0298)	(0.0701)	(0.0391)	(0.0389)
$Poor \times Time$	0.0003	-0.0103***	-0.0028*	-0.0016	0.0224***	0.0107***	0.0106***	0.0014
	(0.0014)	(0.0016)	(0.0015)	(0.0014)	(0.0014)	(0.0027)	(0.0016)	(0.0018)
$Mid \times Time$	0.0070***	-0.0121***	0.0082***	0.0029***	0.0181***	0.0076***	0.0150***	0.0010
	(0.0009)	(0.0010)	(0.0009)	(0.0009)	(0.0009)	(0.0015)	(0.0010)	(0.0011)
$Rich \times Time$	0.0038**	-0.0144***	0.0083***	0.0166***	0.0196***	0.0119*	0.0183***	0.0019
	(0.0019)	(0.0019)	(0.0019)	(0.0023)	(0.0019)	(0.0063)	(0.0024)	(0.0026)
Controls[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.0240	0.0209	0.0250	0.0193	0.0239	0.0176	0.0213	0.0153
N	40991	33838	41788	39996	38639	13230	38746	23413
LS Gap	↑	↓	↑	↑	↓	↑	↑	↔
Inc. Inequality	↓	↔	↑	↔	↔	↓	↓	↓

[1] Controls include age, age^2, marital status, gender, race and education.

Table 3.9: Life Satisfaction and Income Inequality trends in Europe (EB-B).

	UK	Greece	Spain	Portugal
$Poor$	-0.6579***	-0.4970***	-0.6809***	0.1101
	(0.0457)	(0.0566)	(0.1737)	(0.0853)
Mid	-0.2736***	-0.2150***	-0.5988***	0.1009
	(0.0391)	(0.0487)	(0.1641)	(0.0788)
$Poor \times Time$	0.0012	-0.0049**	-0.0010	-0.0138***
	(0.0016)	(0.0020)	(0.0034)	(0.0025)
$Middle \times Time$	0.0061***	-0.0024*	0.0118***	0.0023
	(0.0010)	(0.0013)	(0.0019)	(0.0020)
$Rich \times Time$	0.0091***	-0.0004	-0.0157	0.0197***
	(0.0030)	(0.0025)	(0.0100)	(0.0039)
Controls[1]	Yes	Yes	Yes	Yes
PseudoR^2	0.0231	0.0157	0.0127	0.0257
N	35046	30515	18733	25544
LS Gap	$\uparrow$	$\downarrow$	$\leftrightarrow$	$\uparrow$
Inc Inequality	$\uparrow$	$\downarrow$	$\downarrow$	$\uparrow$

[1] Controls include age, age^2, marital status, gender, race and education.

Table 3.10: Determinants of Aggregate Well-Being in Europe (EB).

	(1)	(2)	(3)
ln(GDP)	0.1833***		0.0504
	(0.0399)		(0.0590)
Avg ln(Income)		0.0956***	0.0789***
		(0.0174)	(0.0261)
β_0	-2.1920***	-1.5655***	-1.8560***
	(0.3928)	(0.2142)	(0.4024)
Year dummies	Yes	Yes	Yes
F	21.0578	30.1479	15.4218
N	270	270	270

CHAPTER IV

Time, Gender and Happiness

4.1 Introduction

The decline in the happiness of American women over the last forty years has recently been added to the list of puzzling facts about happiness [Stevenson and Wolfers(2008b)]. Although the gender happiness gap favored women in the mid-seventiesthe gap had reversed by the mid-two-thousands. Figure 4.1 illustrates this phenomenon in the US; the data is from the General Social Survey. In many regards, the lives of women have improved over the last decades. The women's right movement, the increased availability of oral contraceptive, the fall in the male-female wage gap, the rise in women's educational attaintment and their increased participation in the labor market have all contributed to this. As Stevenson and Wolfers argue (2008), the reversal of the gender happiness gap "rise(s) provocative questions about (...) the legitimacy of using subjective well-being to assess broad social changes.".

The primary goals of this paper are to propose a taxonomy for interpreting empirical analysis in the field of happiness research and to document how happiness differs between men and women. The secondary objective is to test the possibility that gender differences can account for the reversal of the happiness gap. This paper studies three dimensions along which men and women differ in terms of happiness: the life cycle, the effect of time spent working and the effect of labor force status.

The paper starts by describing a general taxonomy to think about happiness research. It builds on the notion that happiness is a good and thus responds to changes in relative prices. I argue that happiness regressions should be thought of as production functions; the inputs of which are time and income. As identified in the literature, the happiness function has an adaptative component and reacts to status effects. The model described provides a framework for interpreting the findings of the present paper and identifies areas of the literature where further work would be especially beneficial.

The paper then documents the evolution of the gender happiness gap in different surveys, highlighting the fact that the decline in female happiness is not observed in panels. As this raises a concern for compositional effects, the paper proceeds to examine the life cycle of happiness. The happiness of men and women follow very different trajectories over the life cycle. Given that the average respondent's age has increased differently for men and women in the GSS, the decline in the happiness of American women could be due to a change in the composition of the sample. As the paper shows, controlling for age effects actually widens the happiness gap.

The paper goes on to measure the importance of time allocation to investigate the possibility that the decline in women's happiness is due to gender differences in the evolution of the cost of happiness. The argument builds on the price theoretic approach of Kimball and Willis and argues that the relative cost of happiness has increased more for women than for men since the mid-seventies [Kimball and Willis(2005)]. The analysis looks at the impact of weekly hours of work on happiness and finds evidence that time spent working has a favorable effect on happiness; this effect is smaller for women. This is interpreted as evidence that time spent working is not a proper proxy for time not invested in the production of happiness because work is an important source of social interaction a key input in the happiness production function. The analysis, thus rejects the idea that gender differences in the evolution of weekly work hours explain the relative decline in female happiness. As the paper shows, the decline of female happiness is more prevalent among employed women.

Finally, the paper examines the importance of work status. Work status indicators are interpreted as proxies for patterns of time allocation. Formal analysis confirms that unemployment is

detrimental to happiness and shows that the effect is smaller for women. Somewhat surprisingly, the paper shows that full-time employment has only a small effect on happiness. Furthermore, part-time employment is negatively associated with men's happiness, but not with women's. I argue that these patterns are consistent with the idea that work takes time away from other activities that raise women's happiness and discuss how research should proceed to further explore this idea.

The remainder of the paper is organized as follows: Section 4.2 explores what it means to consider happiness as a good for empirical research. Section 4.3 describes the data used throughout the paper. Section 4.4 presents the results and interpretation of the analysis. It is divided into three subsections focusing each on the different dimensions. Section 4.5 concludes.

4.2 Happiness is a Good

Kimball and Willis argue that happiness, like health or entertainment, is a higher-order good [Kimball and Willis(2005)]. Base-line mood, or long-run happiness, cannot be purchased in markets but can be produced in the household using time and tradable inputs. Consequently, aggregate changes in happiness, or the lack thereof, reflect changes in consumption patterns. Conceiving happiness as a good does not deny a role for subjective well-being in economics. Peoples' ability to consume happiness is an important indicator of their welfare. Understanding how happiness is produced is important for the same reasons that understanding the determinants of health is. More importantly, departing from the assumption of equivalence between happiness and utility, and recognizing that happiness is a good, highlights the fact that most empirical analyses of well-being do not account for the cost of happiness and the time-intensive nature of its production.

The production of happiness is time-intensive; it requires time spent with friends and family or more generally, time spent interacting with others [Elizabeth W. Dunn and Norton(2008)]. The availability of time is thus a major component of the cost of happiness. Because they affect the trade-offs between different uses of time, socioeconomic changes such as changes in the wage

gender-gap affect the demand for happiness.

The price theoretic approach to happiness suggests a simple explanation to the decline in women's happiness: compared to that of men, the cost of happiness has risen since the mid-seventies for women. Women's consumption of happiness has fallen despite important improvements in their lives because the number of sacrifices they have to make for their happiness has increased along with these other changes in their lives. This is not to say that the changes in women's circumstances have left them worse-off. Rather, it has allowed them to reallocate resources from happiness towards other goods. This paper looks for evidence of this interpretation by investigating the effects of time spent working and work status the happiness of men and women.

Although there exists no explicit empirical investigation of the link between time allocation and happiness, many have investigated the importance of unemployment. Clark and Oswald find that joblessness depresses well-being more than any other personal characteristic and that the effect on happiness is diminished if one lives in a region with high unemployment [Clark and Oswald(1994)] [Clark(2003)]. Using panel data, Winkelman and Winkelman argue that the non-pecuniary effects of unemployment are much larger than the effect that stems from the associated loss of income [Winkelmann and Winkelmann(1998)]. Blancheflower and Oswald find that unemployment hits men harder than women and that it would take about $60,000 per year to compensate a man for unemployment [Blanchflower and Oswald(1999)][1]. Alternatively, Dockery finds that having a job that provides low job satisfaction has an even greater detrimental effect on well-being than being unemployed [Dockery(2005)].

To formalize the intuition presented in this section, consider the following model. An agent must decide how best to allocate her time and resources across a consumption good, happiness

[1] Value estimated for 1999 dollars.

and leisure.

$$\max_{c,h,l} U \quad : \quad U\Big(c, h, l\Big) \tag{4.1}$$

$$st \quad : \quad T = k + l + m \tag{4.2}$$

$$c \leq Wm \tag{4.3}$$

$$h = H(k, c, m, X), \tag{4.4}$$

where c is the agent's consumption of the commodity good the price of which is one dollar per unit, h is her happiness and l is her leisure. Each period, the agent has a limited amount of time available (T) to produce happiness (k), earn income (m) and enjoy leisure (l). For simplicity I assume that $U(\cdot)$ is additively separable in its arguments. The agent can work as many hours as she pleases, up to T, earning W for each m unit of time she works.

$H(k, c, X)$ is the happiness production function. Output (H) depends on the amount of time (k) the agent spends producing happiness, her consumption (c) and elements that are beyond her control (X), such as her personality and the income of other agents.

Substituting the constraints into equation (1) recasts the agent's problem as one of allocation of time between wage earning (m), leisure (l) and happiness production (k). Note that, because the agent's problem is static, optimality implies that she consumes everything she earns.

$$\max_{k,m} U \quad : \quad U_C(Wm) + U_H\big(H(k, Wm, X)\big) + U_L\big(1 - m - k\big) \tag{4.5}$$

The agent's first order conditions are

$$\frac{U'_L(\cdot)}{U'_H(\cdot)} = H'_k(\cdot) \tag{4.6}$$

$$\frac{U'_L(\cdot)}{(U'_C(\cdot) + U'_H(\cdot)H'_c)} = W \tag{4.7}$$

At the optimum the marginal rate of substitution between leisure and time devoted to happiness are proportional to the marginal productivity of time devoted to happiness, i.e. the marginal happiness of time (4.6). Also, the marginal rate of substitution between leisure and work is proportional to the wage rate (4.7). Together with the time constraint (4.2), these conditions determine k^*, l^* and m^*. Alternatively, the equations can be rearranged to show that the marginal rate of substitution between happiness and work is also proportional to the wage rate.

$$\frac{U'_H(\cdot)H'_k(\cdot)}{(U'_C(\cdot)+U'_H(\cdot)H'_c)} = W \tag{4.8}$$

Specifying the agent's utility function would allow comparative statics of the effect of changes in the parameters on time allocation and ultimately on the agent's happiness. Nonetheless, some intuition is readily apparent. Assuming that happiness is a normal and ordinary good really limits the possible explanations of the decline in female happiness. Because women's income has increased over the period of interest, one of the few possible explanations is an increase in the relative price of happiness. There are however complementary phenomenon that come from the particular shape and mechanisms of the happiness production function contributing to the relative decline of happiness consumption among women .

4.2.1 The Production Function of Happiness

By now, it should be clear that estimating the production function of happiness requires accounting for, among other things, time invested in happiness and more generally, things that affect the amount of time available. There is ample evidence in the happiness literature that suggests that the production of happiness suffers from status effects (see Luttmer for example [Luttmer(2004)]) and that happiness adapts to income [DiTella and MacCulloch(2006)]. Consider the following general form of the happiness production function.

$$H(\cdot) = h_k(Time) + h_y(Income) + h_s(Status) + h_a(Adaptation) + \beta_X f(X) \tag{4.9}$$

The happiness function has five components. First, it depends on time invested in happiness (h_k); this refers to the time the agent spends with his friends and family, i.e. time invested in positive social interactions. Happiness also depends on the agent's income (h_y) in addition to his status (h_s), which is often captured by the average income of a reference group such as his community or his neighborhood. The fourth component is adaptation (h_a), the degree to which the agent adapts to changing circumstances, as this has been shown to play a role in individual happiness. Finally, happiness is influenced by the agent's individual characteristics including his personality and age (X).

Many have documented the importance of the last four components of the happiness function. Few, however, have paid attention to its specific form. For example, it is unclear whether the function is stable over time and life circumstances or if it is dynamic. Some have argued, for example, that the decline in women's happiness is the result of a change in the reference group of women. This claim is empirically verifiable. Little work has been conducted to verify whether different groups adapt at different paces or whether the speed of adaptation to changes varies over the life cycle. Of course, the research agenda is largely constrained by the available data. Nonetheless, it seems fair to claim that we know little about the actual shape of the happiness function. Since virtually no work has attempted to find empirical evidence of the importance of the time component, it is the focus of this paper. The analysis will show that the framework presented here can be helpful in interpreting the results.

4.3 Data

The General Social Survey (GSS) is a repeated micro-level cross section of about 1600 Americans covering the years 1972 to 2006 (with some gaps). In each year that it was conducted, the survey asked respondents the following question: "Taken all together, how would you say things are these days; would you say that you are 1. Very Happy 2. Pretty Happy 3. Not too Happy?". The survey gathers information about numerous individual characteristics including age, gender, ethnicity, marital status and education. Although no explicit questions about time invested

in happiness, the GSS measures weekly work hours by asking all respondents how many hours they worked in the previous week, at all jobs' (variable *hrs1*) and respondents unemployed how many hours a week they usually work, at all jobs (variable *hrs2*). In cases where the analysis is broken down by cohorts, I use Bailey's (2002) categorization presented in Table 4.1 [Bailey(2006)]. The GSS categorizes respondents by work status along different dimensions. Table 4.2 reports the frequency of men and women in the categories relevant to the analysis, as well as the overall frequency.

The Health and Retirement Study (HRS) is a bi-annual panel of roughly 22,000 retired Americans covering the years 1992 to 2004. The HRS's subjective well-being measure comes from answers to a subset of questions from the Center for Epidemiologic Studies of Depression (CES-D), aimed at measuring depressive symptoms. One such questions asks: "Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true (Yes/No) for you much of the time this past week? Much of the time during the past week you have felt - sad, happy, depressed and enjoyed life". A composite SWB score is obtained by summing the respondents answers to each question.[2]

The German Socio Economic Panel (GSOEP) is a yearly panel of about 2750 German adults; it gathers detailed socioeconomic information as well as a life satisfaction measure over a period ranging from 1984 to 2005. The survey poses the following question: "(...) we would like to ask you about your satisfaction with your life in general. Would you say you are 1. Completely dissatisfied ... 10. Completely satisfied". The survey gathers a wide range of socio-demographic questions, among which is average weekly hours of work (*tatzeit*). The categories used to described the respondents' work status are also reported in Table 4.2.

4.4 Analysis

The analysis starts by documenting the decline in female happiness. Following Stevenson and Wolfers (2009), a formal estimate of the time trend of the happiness gap is measured [Stevenson

[2] A weight is attributed to each answer based in the inverse of its frequency.

and Wolfers(2008b)]. Then the paper documents the differences between the genders and assesses whether these differences can account for the decline in women's happiness for each dimension over which men and women happiness is studied. More precisely, effects on the time trend of the gender happiness gap are quantified.

4.4.1 Declining Female Happiness

Figure 4.1 shows the happiness of male and female respondents of the GSS since 1975. Two elements are apparent. Firstly, the decline in female happiness. Although it is somewhat volatile, women's happiness has a distinct negative trend over the three decades of the survey. While women where happier than men in the mid-seventies, this gap reversed itself by the beginning of the new millennium.

Table 4.3 formalizes this decline by estimating non-parametric estimates of the time trend. The following equation is estimated.

$$\begin{aligned} H_{it} &= \beta_W(Women_i) + \beta_{WT} Women_i \times \left(\frac{Time_t}{100}\right) + \beta_{MT} Men_i \times \left(\frac{Time_t}{100}\right) \\ &\beta_0 + + X'\beta_X + \epsilon_{it}, \end{aligned} \tag{4.10}$$

where β_W captures the difference between male and female happiness in 1972. β_{WT} and β_{MT} represent the change in happiness per 100 years, the variable $Time$ is the difference between the respondent's survey year and the first year of the survey. X is a vector of individual characteristics which can include indicators for religion, an indicator for the presence of children at home, indicators for educational achievement and indicators for marital status. An estimate of the trend of the gender happiness gap is obtained by taking the difference between β_{MT} and β_{WT}; a significantly positive gap implies that men's happiness is growing faster than women's (or declining at a slower rate). Tables 4.3, 4.4, 4.5 and 4.6 report these estimated for the full sample of the GSS, the white respondents of the GSS, the GSOEP and the HRS. The GSS estimates are obtained with ordered probits and the full sample of the GSOEP and the full sample of the HRS are obtained using linear regression with fixed effects. Standard errors are clustered at the year level for all of

the models.

To make the interpretation of the tables explicit, column (1) of Table 4.3 is interpreted in greater detail. According to the estimates, the difference between male and female happiness in 1972 was about 7% of one standard deviation (0.0734). Computing the corresponding gender gap for the last year of the survey, 2006 suggests a reversed gender gap of 5% of one standard deviation.[3] The gap has grown by about 12% of a standard deviation over the 35 years of the survey. To give an idea of the magnitude of this change, observe that doubling the income of the average respondent has a comparable effect.[4]

Column (1) of each table reports the estimates obtained without controls. In all of the data sources, the positive coefficient on $Women$ confirms that women have generally reported higher levels of happiness. Comparing the estimates from Table 4.3 and 4.4 highlights, as Stevenson and Wolfers identified, that the decline in female happiness is more pronounced among the white population [Stevenson and Wolfers(2008b)]. In fact, for the full sample, the inclusion of the controls, column (2), and personal income, column (3), renders the time trend of female happiness insignificant.

Column (1) of Table 4.5 shows no evidence of a relative decline in female happiness in Germany. As the β_{WT} and β_{MT} estimates show, this is because male and female happiness decline at similar rates. The inclusion of controls (2) and personal income (3) do not significantly alter this result. Table 4.6 presents the same analysis for retired Americans (HRS); the period covered by the survey is shorter and more recent. This could explain the fact that the inclusion of controls (2) and personal income (3) render the time trend of the gender gap insignificant.

The fact that no significant time trend is identified for the gender gap in the panels raises the concern that the decline in happiness could results from the changing composition of the GSS over the relevant years. Of particular concern are changes in the prevalence of the cohorts and age groups.

Figure 4.2 reports the happiness of each cohort by gender over time. Although the absolute

[3]The gender gap in 2006 is obtained by computing $\hat{\beta}_W + (2006 - 1972)/100 \times \hat{\beta}_{WT} - (2006 - 1972)/100 \times \hat{\beta}_{MT}$.
[4]Column (3) of Table 1 estimates the coefficient on $log(Income)$ to about 0.13.

decline in happiness is most apparent for the older cohorts, the relative decline is evident for all cohorts. This could suggest that the absolute decline of female happiness is a phenomena of the older cohorts. Because the younger cohorts are observed only during their younger age, it is important to verify whether life-cycle effects are also at play.

4.4.2 Happiness over the Life Cycle

Figure 4.3 shows the happiness of male and female respondents over the life-cycle for all three surveys. The dashed line shows well-being as predicted by a regression of well-being on age and a quartic in age interacted with gender.

The figure clearly shows different patterns for male and female. As illustrated by figure (a) and (b), young women tend to be happier then men and their happiness increases until the late twenties after which it starts to decline steadily until the late fifties. For the remainder of the life cycle, female happiness is somewhat volatile but the overall trend is negative. Men happiness increases until the early thirties and is roughly stable until retirement. Male and female happiness roughly track one another during the period of active labor participation, but diverge around the age of sixty-five. Male happiness increase at retirement such that the happiness of each gender spread onward.

Figure 4.4 shows the happiness life cycle patterns of men and women for each cohort in the GSS. The trends identified with the entire sample are observable within each cohort, suggesting that it is not necessary to make distinctions between the cohorts in the econometric analysis. The following equation is thus estimated to formalize the life cycle trends.

$$\begin{aligned} H_{it} &= \beta_0 + \beta_W(Women_i) + \beta_{WA1}(Women_i \times Age_i) + \beta_{MA1}(Men_i \times Age_i) \\ &\quad + \beta_{WA2}(Women_i \times Age_i^2) + \beta_{MA2}(Men_i \times Age_i^2) + X'\beta_X + \epsilon_i, \end{aligned} \tag{4.11}$$

where β_{WA1} and β_{MA1} capture the linear effect of age on female and male well-being and β_{WA1} and β_{MA1} captures the quadratic effect of age. Column (4) of Table 4.3 to 4.6 report the correspond-

ing estimates.

In the GSS, female happiness follows an inverse "u-shape" over the life cycle, peaking in the late forties (β_{WA1}/β_{WA2}). The coefficients indicate that men's happiness rises steadily with age, although at a declining rate. Said differently, the estimated happiness peak (β_{MA1}/β_{MA2}) is beyond the average male life expectancy. The "u-shape" life cycle pattern of happiness identified by some authors in the GSS would be observed if the data was not broken down by gender [Blanchflower and Oswald(1999)]. Easterlin attributes this incorrect description of the life cycle to the failure to account for age-period-cohort effects but the pattern of diverging gender happiness emerges even without such controls [MArcelli and Easterlin(2005)].

The patterns estimated in the GSOEP panel are somewhat different. Here, happiness follows a "u-shape" for both genders. Female happiness falls at a declining rate over life, reaching the bottom beyond the living age. Male happiness rises until the late forties and subsequently declines. As the respondents are much older, the patterns suggested by the HRS data describe the evolution of happiness in the latter days of the life cycle. As with the GSS, the estimates suggest that happiness follows an inverse "u-shape". In the case at hand, happiness peaks at around retirement age for men (65 years of age) and in the mid-fifties for women.

As is apparent from panel (b) of Figure 4.6, the average age in the GSS has increased steadily since the beginning of the survey. More importantly, it has increased at different rates for men and women. To account for the potential effect of the changing age composition and the different time path of happiness over the life-cycle for each gender, Equations 4.10 and 4.11 are estimated jointly.

Column (5) of Tables 4.3 and 4.4 look at the effect of age, as accounted for with the gender-age-age-square specification. The inclusion of the gender-age-age-square variables does not affect the estimated time trend of the gender happiness gap for either the full-sample or the white subsample[5]. This, however, could be due to the fact that the quality of the fit of this specification over the working years (where the most of the mass of the respondents is concentrated) is poor, as shown by Figure 4.5. Column (6) verifies this possibility by accounting for life cycle effects with

[5]This specification are not estimated with the panels as the Age and Age^2 variables interacted with the gender variable are perfectly collinear with the fixed effects.

the inclusion of $Age \times Gender$ dummy variables. As the results show this does not significantly affect the gender happiness gap in any of the surveys.

The life cycle patterns identified in all three surveys confirm the fact that happiness of men and women follow very different trajectories over the life cycle. Also interesting is the fact that happiness tends to be falling over the years of active labor participation for both genders. This initial finding is consistent with the notion that work takes time away form happiness described in Section 4.2. Consequently, the following section explores the effects of time spent working and work status on happiness.

4.4.3 Work

Figure 4.7 presents the proportion of respondents of each sex that report being employed and the corresponding average weekly hours of work. The gender difference shows a drastic decline for both variables. Women's average employment and hours of work have increased at a faster rate than men's over the last decades. Note that these changes have left the gender income gap roughly stable (panel (a) of Figure 4.6).

Work hours

Figure 4.8 illustrates the evolution of the average number of hours of work per week by employment status for men and women. Hours of work have followed similar trajectories for male and female full-time workers. This is not the case for part-time workers where the average number of work hours has remained roughly stable for men but increased drastically for women. Stated differently, the change in work hours is only a gender specific factor among part-time workers.

To formalize the effect of time spent working on happiness and the gender gap, weekly work hours and its square are added to Equation 4.10. Tables 4.7, 4.8, 4.9 and 4.10 report the corresponding estimates for each sub-sample/survey.

Column (1) of each table is reported to allow comparisons. Column (2) includes the number of hours worked. Nowhere does weekly work hours have the predicted negative effect on happiness. The effect is insignificant among retired workers (HRS) and positive among the working

population of the US (GSS) and Germany (GSOEP). Happiness calculus suggests, for example, that among German workers, 10 hours of work has the same beneficial effect on happiness as a 16.5% increase in income ($10 \times 0.0034/0.2059$, column (2), Table 4.9). Column (3) includes a quartic in weekly work hours to investigate the possibility that the beneficial effects of time spent working diminish over time. Such effects are only identified in the GSOEP and suggest that the optimal length of a work week is approximately 80 hours ($\beta_{Hrs^2}/\beta_{Hrs}$). Neither the linear nor concave specification of weekly work hours lowers the time trend of the happiness gender gap in the GSS.

To allow for the possibility that the effects on well-being of time spent working are different for men and women, column (4) includes an interaction term between work hours and a gender indicator. The net effect of work hours for female respondents can thus be obtained by looking at the sum of the coefficient on work hours and the interaction term. Among the working population (GSS and GSOEP), the interaction coefficient is negative and statistically significant. In the GSS, the assumption that the net effect of work hours on women's happiness is nil cannot be rejected ($t = 1.27$ in the full sample and $t = 1.51$ in the white sub-sample). The same test in the GSOEP identifies a barely significant effect ($t = 1.78$). This difference between men and women does not explain the decline in women's happiness as the estimates of the gap remain roughly unaffected by the inclusion of these extra terms.

To the extent that weekly work hours is a proper proxy for time taken away from happiness, the fact that its effect on happiness is positive is rather surprising. To understand why this could be the case, I turn to Equation 4.9. The assumption behind the hypothesis that time spent working will lower happiness is that it lowers the amount of time spent producing happiness, the h_k component of the production function. It is possible, however, that work hours actually increases time invested in happiness. Specifically, if part of the agent's job involves positive social interactions with co-workers or clients, time spent working will have a positive effect on happiness. Better data on the job characteristics of the respondents would allow for further exploration of this possibility. Unfortunately such data is not presented in the available surveys. It is also possible that work hours have a positive effect on the agent's status, h_s. Of course, it seems more likely that it is the type of work rather then the length of the work week that matters for a respondent's status,

but since the former is not included in the regression, work hours could capture status effects.

Until the characteristics of the respondent's work are controlled for or the relationship between the length of one's work week and these characteristics are better understood, the implication of the results reported here imply about the price theoretic approach to happiness will remain unclear. In the meantime, it seems relevant to stress that evidence of the gender differential effects of time allocation for happiness are apparent in the data. As it appears that men and women experience labor force participation differently, the next section investigates the importance of work status for the well-being of each gender.

Work Status

Figure 4.9 shows the evolution of happiness by work status for each gender. Not surprisingly, unemployed respondents are the least happy group among both men and women. Men who work full-time are happier than those who work part-time. Interestingly, this is not the case with women; women who work part-time are generally happier than full-time counterparts. Figure 4.10 reports the evolution of the happiness gap for each employment group. As the figures suggest, the gender happiness gap has followed different trajectories among each group. The difference between female and male happiness has increased for full-time workers, remained somewhat constant for part-time workers and decreased for the unemployed. In other words, the figures suggests that the decline in female happiness appears to be a phenomenon of the fully employed.

Columns (5), (6), (7) and (8) of Tables 4.7 through 4.9 quantify the evolution of the gender happiness gap within work status groups. The analysis shows no evidence of difference by work status in the panels but confirms that, in the GSS, the relative decline of female happiness is only observed among the working population, more precisely among full-time workers. Consequently, for the full-sample and the white sub-sample, the time trend in the gender happiness gap is larger when the analysis is limited to fully employed respondents. Among the white respondents, the time trend is 0.5017 for all work statuses and 0.7434 for the fully-employed. The gender happiness gap shows no significant time trend among the partly-employed, the unemployed and the respondents reporting to be "keeping house". The estimated gaps in the HRS and GSEOP remain

insignificant in each work status sub-sample.

One interpretation of the fact that the relative decline in women's happiness is concentrated among the fully-employed is that status effects are dynamic. Where the formation of the reference group depends on the agent's work status, increased participation in the labor market would have a negative effect on women's well-being. It is possible that fully-employed women are more likely to include fully-employed men in their reference groups than other women are. This hypothesis is empirically verifiable cannot be tested with the GSS. Previous work has shown that people make comparisons with others that are geographically close to them; unfortunately, in the GSS, information regarding the respondents' location is too broadly defined to be useful [Barrington-Leigh and Helliwell(2008)].

To further explore the importance of work status, Equation 4.10 is augmented with work status indicators and gender interaction terms. Table 4.11 reports the results, with corresponding effects on the gender gap. The analysis focuses solely on the GSS and the GSOEP as the HRS does not provide much variance in the respondents work status. Column (1), (3) and (5) include the benchmark regressions from the full sample of the GSS, the white sub-sample of the GSS and the full sample of the GSOEP, respectively.

In the GSS the analysis reveals similar patterns for the full sample and the white sub-sample, columns (2) and (4). As expected, unemployment has a large negative effect on happiness. The relative magnitude of the unemployment coefficient (-0.4126) compared to the income coefficient (0.1469) is what has led others to the conclusion that the monetary cost of job loss are smaller than the psychological costs [Winkelmann and Winkelmann(1998)]. Full time employment is positively associated with well-being; the effect, however, is not significant in the white sub-sample. It should be noted that the coefficient is relatively small compared to the effect of unemployment (0.0404). Interestingly, part-time employment has a negative effect on well-being (-0.0887).

The genders differ on two levels. First, part-time work does not have a negative effect on female happiness (the net effect is not statistically significant, $-0.0887 + 0.1261 = 0.0374$). Also, the effect of unemployment is lower for women than for men. These patterns are in line with the notion that work takes time away from a woman's production of happiness or that it does so

differently than for men.

The results from the GSOEP are somewhat different but confirm the presence of clear gender differences. Here too, the effect of unemployment on well-being is undeniably negative (-0.2380). Furthermore, as is the case with the GSS, this effect is dampened if the respondent is a women. In fact, the analysis suggests that unemployment has no effect on female happiness ($-02380 + 0.2066 = 0.0314$). Full time employment is not associated with male or female life satisfaction. Contrary to what is identified in the GSS, part-time work increases well-being for men, but has no effect on women ($0.2175 - 0.2292 = -0.0117$). In the GSOEP, only 6% of the respondent are women who work part time ; that category of work status is vastly dominated by men. The GSOEP sample consists of about 20% community service workers, about 70% of whom are women. The effect of being in community service is negative for men (-0.2016), but the net effect on women is nil ($-0.2016 + 0.2529 = 0.0513$).

Labor force status has gender specific effects on happiness. There is evidence that women experience job loss with less hardship than men do, suggesting either that the status loss is smaller for them or that the loss of positive social interactions that accompany unemployment is less important for women. It could be, for example, that they maintain contact with ex-coworkers or that they had less contact with them to begin with. In both surveys, the overall pattern is that work status matters much less for the well-being of women than it does for that of men. This holds true when controlling for personal characteristics and personal income. The simplest interpretation is that the happiness functions of men and women are different. Of course, as explained earlier, it is hazardous to make such inferences until further analysis that account for the characteristics of the work are conducted. Still, the notion that happiness is a time-intensive good to produce is consistent with the empirical findings presented here.

4.5 Conclusion

This paper proposes a framework for thinking about happiness research and documents gender differences between male and female happiness. In parallel, the paper investigates the possi-

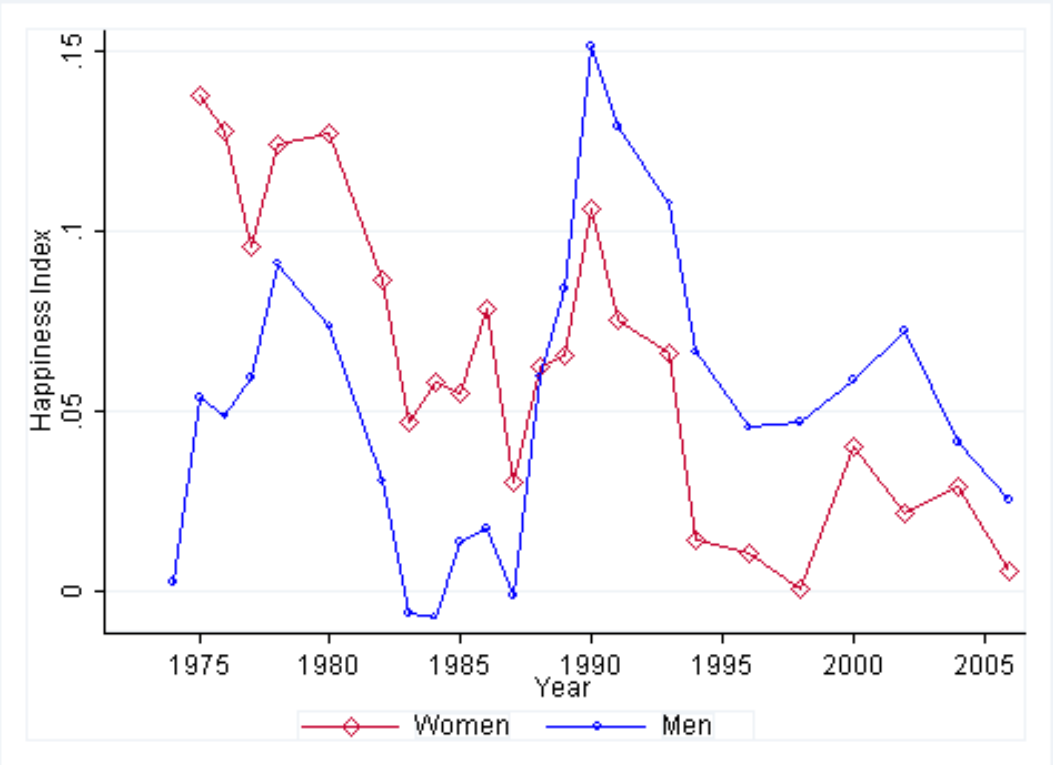
bility that gender specific factors explain the decline of female happiness since the mid-seventies.

The framework presented in the paper builds on the notion that happiness is a good. This idea stresses the importance of time allocation for personal happiness. The model also includes other consensual findings about happiness, such as the importance of personal income, adaptation and status effects. The discussion highlights productive areas for further research, including the formation of reference groups and their effect on happiness.

The paper starts by describing the decline in female happiness for different sub-samples and shows that there is no evidence of the decline in women's well-being in the GSOEP and the HRS, both of which are panels. The life cycle of male and female well-being are very different. Women tend to be happier than men at a young age but the opposite is true after retirement. Gender differences with regards to the well-being effects of time spent working and work status are also documented. None of the gender specific factors described in the analysis account for the reversal of the gender happiness gap in the US, but the results are interpreted as evidence that time allocation is an important factor for personal well-being.

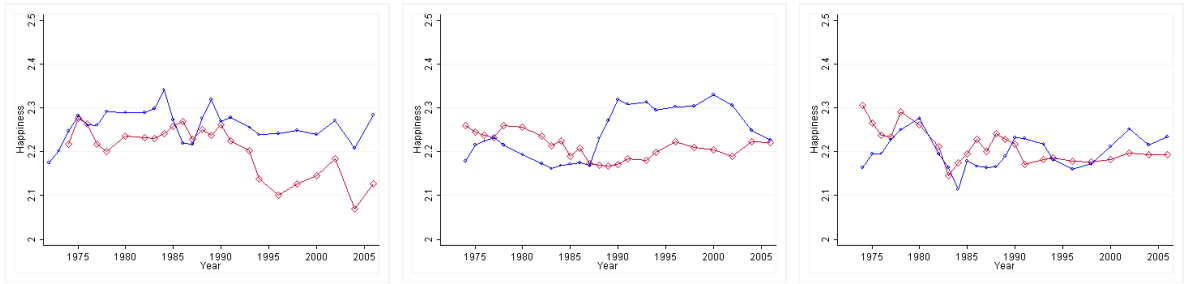
Economists are still uncertain about what they can learn from happiness research. The decline of female happiness since the mid-seventies challenges the assumption of equivalence between well-being and utility: every piece of evidence suggests that the opportunities available to women have increased over this period yet their happiness has fallen. This paper attempts to demonstrate that the conception of happiness as a good and a time-intensive commodity to produce can potentially reconcile the inconsistency.

Figure 4.1: Happiness by Gender over Time in the US (GSS).

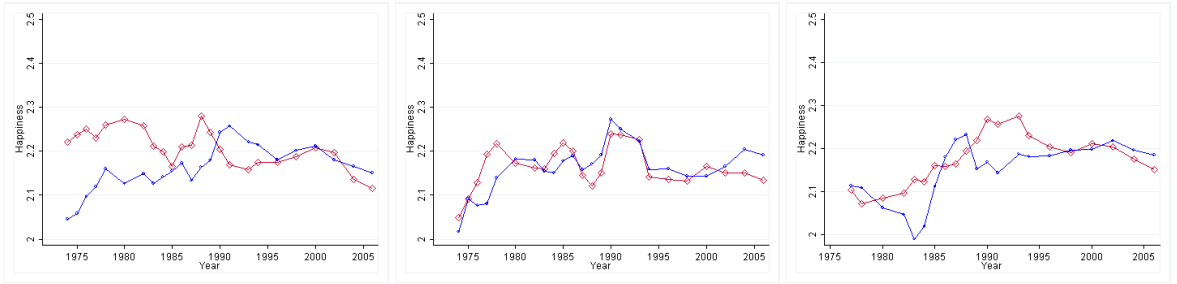


The happiness scores are the coefficients from an ordered probit regression of happiness on $Year \times Gender$ dummies. The data is smoothed using three year moving-averages.

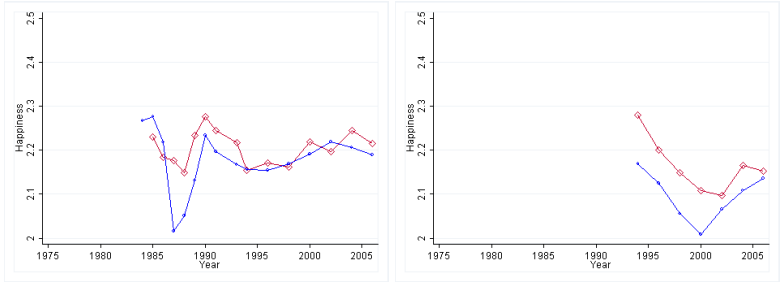
Figure 4.2: Happiness Over Time by Birth Cohort and Gender (GSS)



(a) <=1921 (b) 1921-39 (c) 1940-45

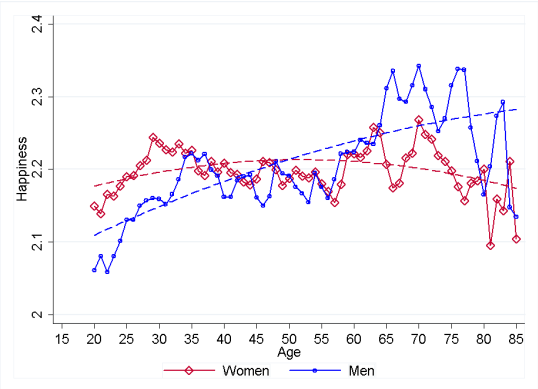


(d) 1946-52 (e) 1953-58 (f) 1959-65

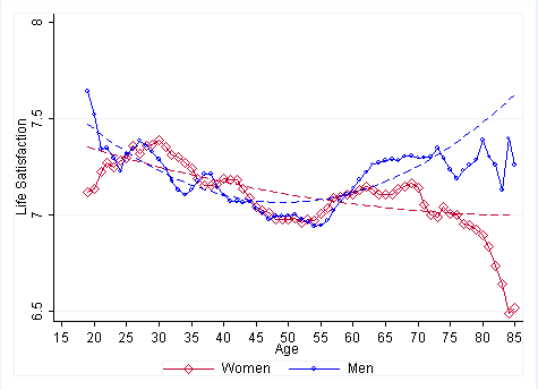


(g) 1966-75 (h) 1976-88

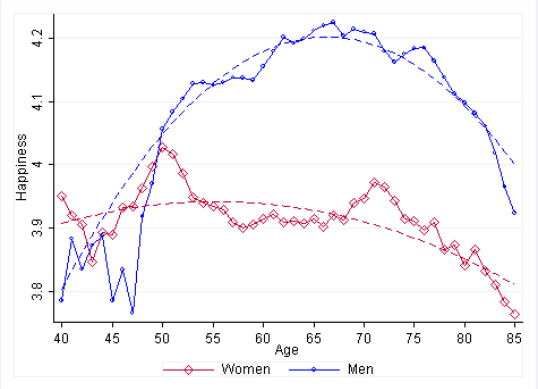
Figure 4.3: Happiness over Time and Over the Life Cycle by Gender in the US (GSS).



(a) US (GSS)

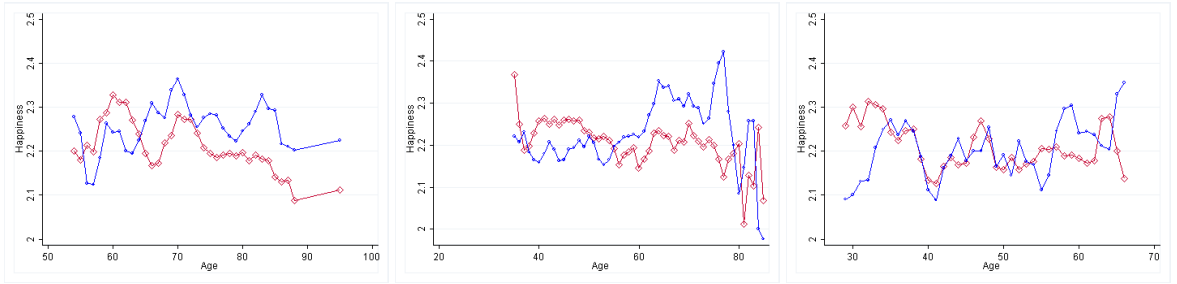


(b) Germany (GSOEP)

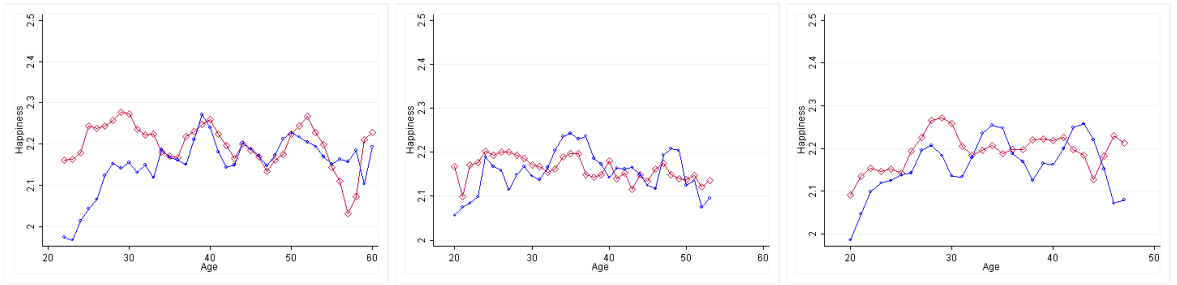


(c) US (HRS)

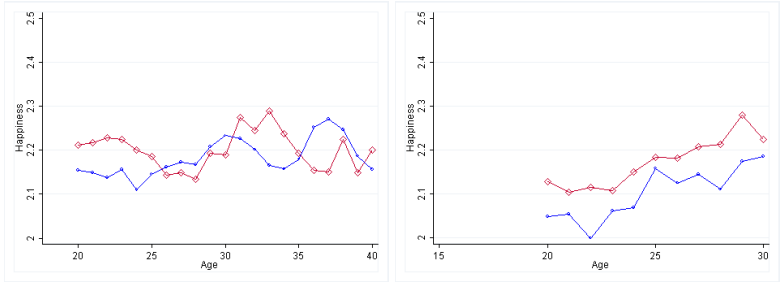
Figure 4.4: Happiness Over The Life-Cycle by Birth Cohort and Gender (GSS)



(a) <=1921 (b) 1921-39 (c) 1940-45

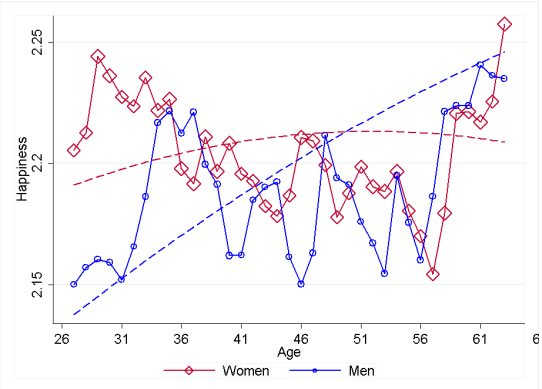


(d) 1946-52 (e) 1953-58 (f) 1959-65

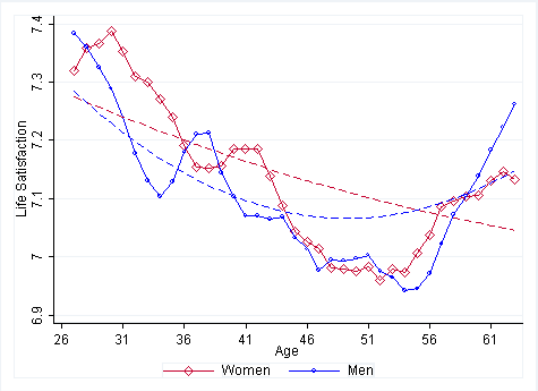


(g) 1966-75 (h) 1976-88

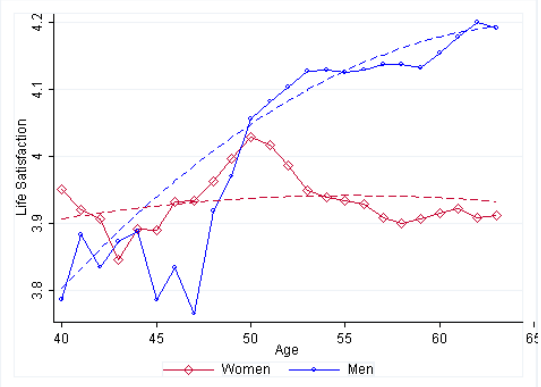
Figure 4.5: Happiness during the Middle of the Life-Cycle by Gender.



(a) US (GSS)

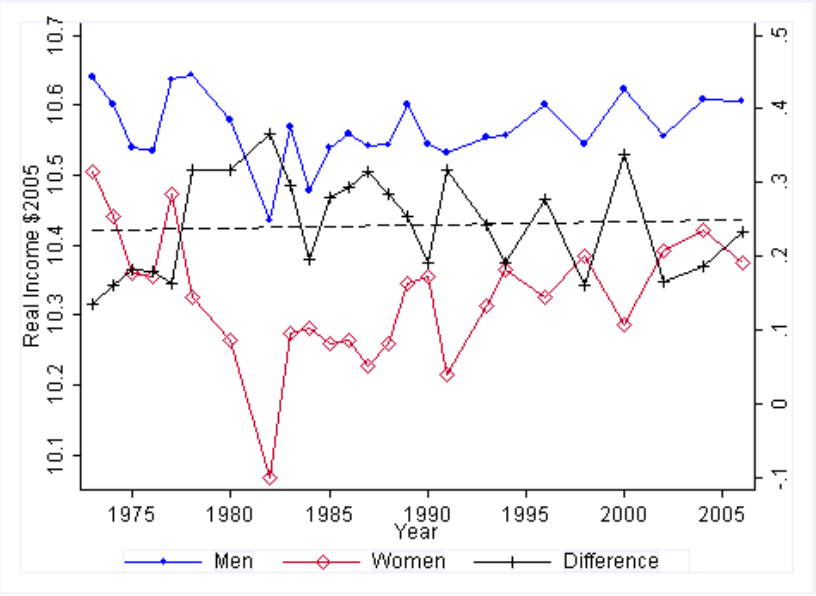


(b) Germany (GSOEP)

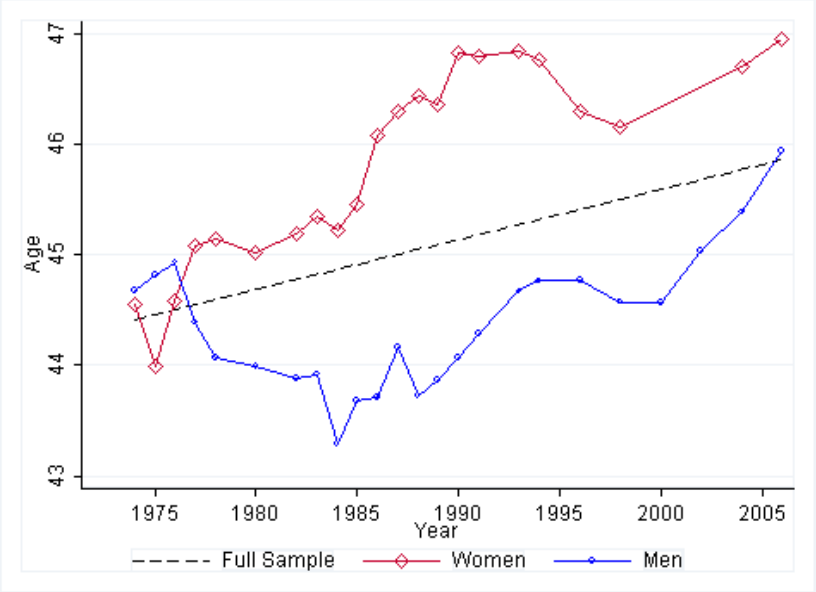


(c) US (HRS)

Figure 4.6: Average Respondent Income and Age Over Time by Gender (GSS).

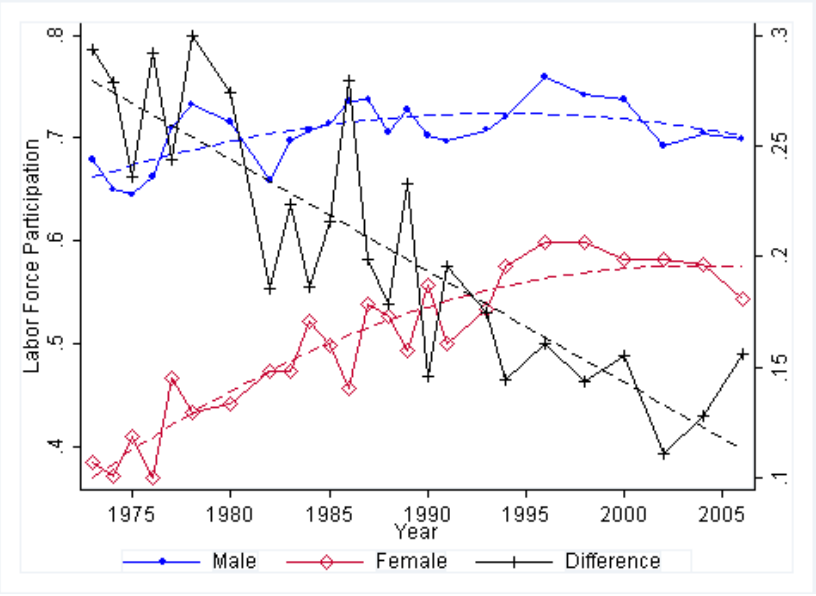


(a) Log(Income)

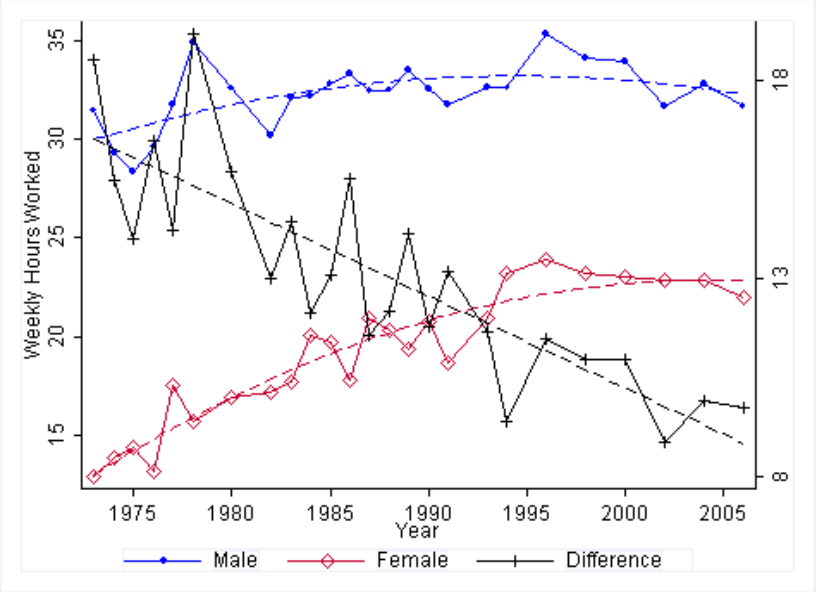


(b) Age over Time

Figure 4.7: Employment Rate and Weekly hours by Gender in the US (GSS).

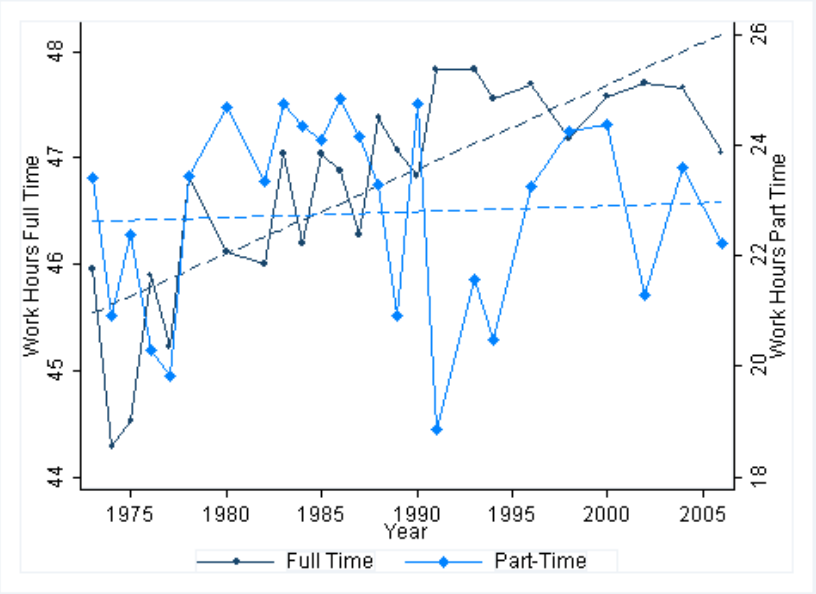


(a) Employment Rate

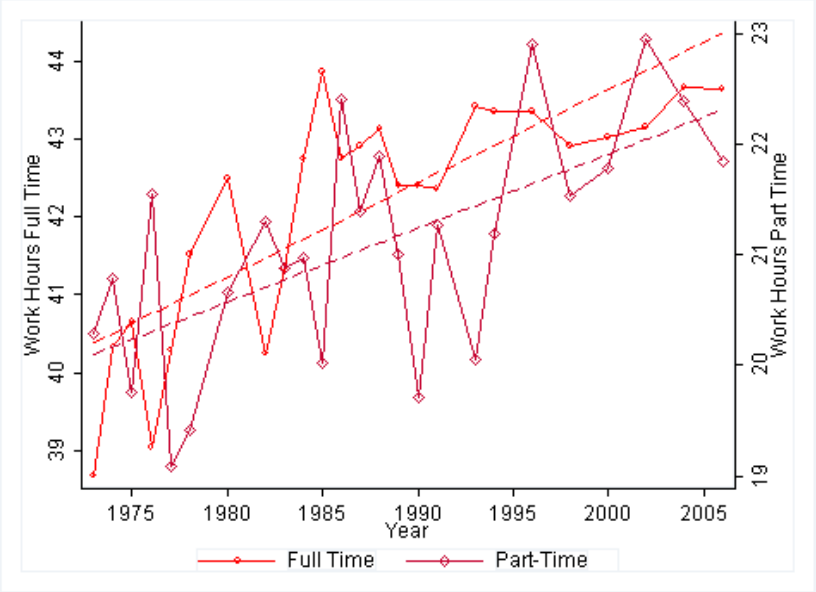


(b) Weekly Hours

Figure 4.8: Weekly hours of Work by Gender and Employment Status (GSS).

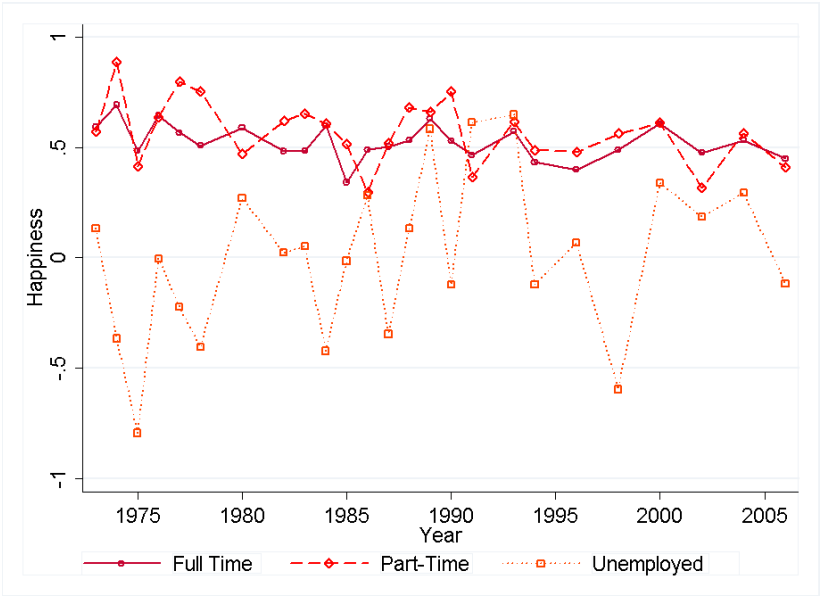


(a) Men

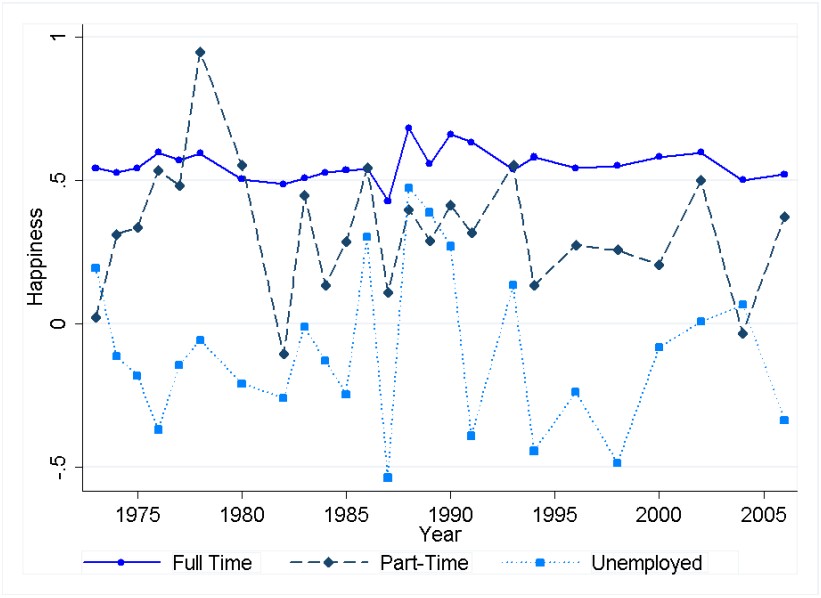


(b) Women

Figure 4.9: Happiness by Gender and Employment Status (GSS).

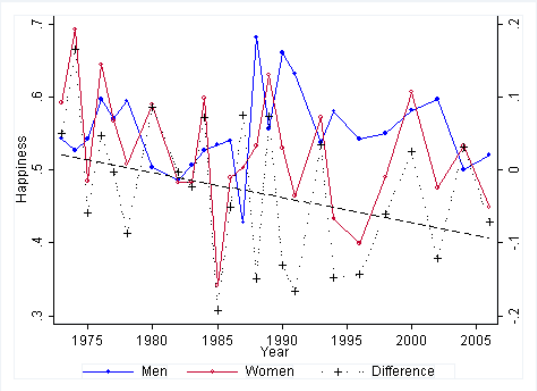


(a) Women

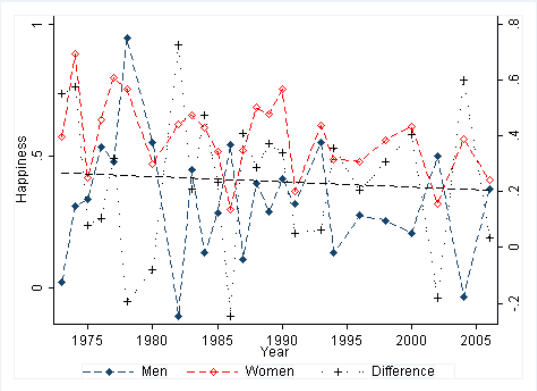


(b) Men

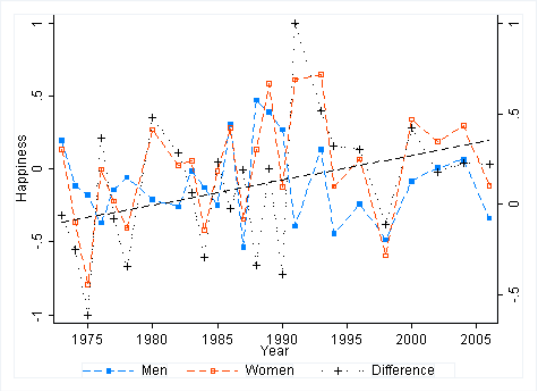
Figure 4.10: Gender Happiness-Gap by Employment Status (GSS).



(a) Full-Time



(b) Part-Time



(c) Unemployed

Table 4.1: Categorization of the Cohorts.

DOB	Cohort
$\leq$ 1921	Grand-Parents of Boomers
1921 - 1939	Parents of Boomers
1940 - 1945	Parents of Gen X
1946 - 1952	Early Boomers
1953 - 1958	Mid-Boomers
1959 - 1965	Late Boomers
1966 - 1975	Generation X
1976 - 1988	Children of Boomers

Table 4.2: Proportion of Men and Women by Work Status in the GSS and GSOEP.

	GSS			**GSOEP**		
	Men	Women	Sample	Men	Women	Sample
$Full\ Time$	56.3%	43.7%	49.73%	72.21%	27.79%	46.09%
$Part\ Time$	31.2%	68.8%	10.14%	6.66%	93.34%	7.82%
$Unemployed$	65.1%	34.9%	12.99%	33.87%	66.13%	17.02%
$Keeping\ House$	2.9%	97.1%	1.91%			
$Community\ Service$				27.72%	72.28%	20.36%

Table 4.3: Age and the Gender Happiness Gap in the US (GSS).

	(1) (T)	(2) (TX)	(3) (TI)	(4) (A)	(5) (TA)	(6) (TAi)
$Women$	0.0734***	0.1465***	0.1661***	0.1735***	0.2222***	
	(0.0215)	(0.0216)	(0.0229)	(0.0654)	(0.0648)	
$Women \times Time$	-0.2978***	0.0826	0.0052		-0.3141***	-0.0217
	(0.1147)	(0.1118)	(0.1118)		(0.1191)	(0.1182)
$Men \times Time$	0.0679	0.4995***	0.4457***		0.0427	0.4556***
	(0.1275)	(0.1400)	(0.1393)		(0.1306)	(0.1411)
$ln(Income)$			0.1312***			0.1624***
			(0.0075)			(0.0075)
$Women \times Age$				0.0065***	0.0069***	
				(0.0023)	(0.0023)	
$Men \times Age$				0.0089***	0.0088***	
				(0.0020)	(0.0020)	
$Women \times Age^2$				-0.0001***	-0.0001***	
				(0.0000)	(0.0000)	
$Men \times Age^2$				-0.0000*	-0.0000*	
				(0.0000)	(0.0000)	
Gap	0.3657***	0.4169***	0.4405***		0.3569**	0.4773***
	(0.1374)	(0.1280)	(0.1290)		(0.1419)	(0.1344)
$Gender \times Age$ dummies	No	No	No	No	No	Yes
$Controls$	No	Yes	Yes	No	No	Yes
N	46303	46153	41707	46153	46153	46011

[1] Controls include Race, Education, Marital Status, Children and Religion Indicators.

Table 4.4: Age and the Gender Happiness Gap in the US among the White Population (GSS).

	(1) (T)	(2) (TX)	(3) (TI)	(4) (A)	(5) (TA)	(6) (TAi)
$Women$	0.1082***	0.1909***	0.2050***	0.2213***	0.2669***	
	(0.0258)	(0.0249)	(0.0264)	(0.0730)	(0.0753)	
$Women \times Time$	-0.3627***	-0.1427	-0.1961*		-0.3535***	-0.2168*
	(0.1216)	(0.1223)	(0.1116)		(0.1274)	(0.1140)
$Men \times Time$	0.0344	0.3746***	0.3056**		-0.0018	0.3180***
	(0.1139)	(0.1386)	(0.1531)		(0.1185)	(0.1563)
$ln(Income)$			0.1426***			0.1819***
			(0.0090)			0.0092
$Women \times Age$				0.0052**	0.0056**	
				(0.0026)	(0.0026)	
$Men \times Age$				-0.0000	-0.0000	
				(0.0000)	(0.0000)	
$Women \times Age^2$				-0.0001***	-0.0001***	
				(0.0000)	(0.0000)	
$Men \times Age^2$				-0.0000*	-0.0000*	
				(0.0000)	(0.0000)	
Gap	0.3971***	0.5173***	0.5017***		0.3517**	0.5348***
	(0.1334)	(0.1237)	(0.1341)		(0.1394)	(0.1401)
$Gender \times Age$ dummies	No	No	No	No	No	Yes
$Controls$	No	Yes	Yes	No	No	Yes
N	38176	38176	34637	38067	38067	38067

[1] Controls include Education, Marital Status and Children.

Table 4.5: Age and the Gender Happiness Gap in Germany (GSOEP).

	(1) (T)	(2) (TX)	(3) (TI)	(4) (A)	(6) (TAi)
$Women \times Time$	-0.0323***	-0.0291***	-0.0291***		-0.0401**
	(0.0024)	(0.0025)	(0.0025)		(0.0186)
$Men \times Time$	-0.0302***	-0.0292***	-0.0298***		-0.0303***
	(0.0025)	(0.0026)	(0.0026)		(0.0042)
$ln(Income)$			0.2338***		0.2884***
			(0.0270)		(0.0288)
$Women \times Age$				-0.0130	
				(0.0087)	
$Men \times Age$				-0.0170*	
				(0.0089)	
$Women \times Age^2$				-0.0002**	
				(0.0001)	
$Men \times Age^2$				-0.0001	
				(0.0001)	
Gap	0.0021	-0.0001	-0.0007		0.0098
	(0.0034)	(0.0034)	(0.0034)		(0.0190)
$Gender \times Age$ dummies	No	No	No	No	Yes
$Controls$	No	Yes	Yes	No	Yes
N	58394	57997	57997	57997	57997

[1] Controls include Race, Education and Marital Status.

Table 4.6: Age and the Gender Happiness Gap amon Retired Americans (HRS).

	(1)	(2)	(3)	(4)	(6)
	(T)	(TX)	(TI)	(A)	(TAi)
$Women \times Time$	-0.0208***	-0.0157***	-0.0152***		-0.0086
	(0.0012)	(0.0013)	(0.0014)		(0.0146)
$Men \times Time$	-0.0171***	-0.0150***	-0.0147***		0.0003
	(0.0012)	(0.0013)	(0.0013)		(0.0144)
$ln(Income)$			0.0286***		0.0303***
			(0.0061)		(0.0062)
$Women \times Age$				0.0050	
				(0.0078)	
$Men \times Age$				0.0603***	
				(0.0105)	
$Women \times Age^2$				-0.0002***	
				(0.0001)	
$Men \times Age^2$				-0.0006***	
				(0.0001)	
Gap	0.0037**	0.0007	0.0004	0.0089	0.0089
	(0.0017)	(0.0018)	(0.0019)	(0.0205)	(0.0205)
$Gender \times Age$ dummies	No	No	No	No	Yes
$Controls$	No	Yes	Yes	No	Yes
N	117935	113491	101999	101997	101997

[1] Controls include Race, Education and Marital Status.

Table 4.7: Work and the Gender Happiness Gap in the US (GSS).

	(1) (TI)	(2) (WRKIX)	(3) (WRKIX2)	(4) (WRKIXG)	(5) (TFT)	(6) (TPT)	(7) (TUN)	(8) (TKH)
$Women$	0.1661***	0.2076***	0.2076***	0.2486***	0.1666***	0.2621***	0.2544*	0.3179*
	(0.0229)	(0.0251)	(0.0251)	(0.0232)	(0.0318)	(0.0947)	(0.1476)	(0.1709)
$Women \times Time$	0.0052	-0.1109	-0.1111	-0.0754	0.0157	-0.1999	0.6070	0.0640
	(0.1118)	(0.1092)	(0.1079)	(0.1126)	(0.1690)	(0.2544)	(0.6512)	(0.1456)
$Men \times Time$	0.4457***	0.3990***	0.3990***	0.3665***	0.5832***	-0.0012	0.8387**	1.2248
	(0.1393)	(0.1194)	(0.1197)	(0.1105)	(0.1577)	(0.4243)	(0.3872)	(0.7870)
$ln(Income)$	0.1312***	0.1469***	0.1469***	0.1475***	0.1782***	0.1045***	0.0770**	0.1675***
	(0.0075)	(0.0075)	(0.0075)	(0.0074)	(0.0145)	(0.0193)	(0.0340)	(0.0159)
$HoursWorked$		0.0017***	0.0017**	0.0026***				
		(0.0004)	(0.0008)	(0.0004)				
$(HoursWorked)^2$			-0.0000					
			(0.0000)					
$Hours \times Women$				-0.0020***				
				(0.0006)				
Gap	0.4405***	0.5098***	0.5101***	0.4419***	0.5676***	0.1987	0.2317	1.1608
	(0.1290)	(0.1321)	(0.1324)	(0.1300)	(0.1582)	(0.5329)	(0.6419)	(0.8331)
$Sample$	Full	Full	Full	Full	Full-Time	Part Time	Unemployed	At Home
$Controls$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	41707	41639	41639	41639	21313	4203	1236	7120

[1] Controls include Race, Education, Marital Status, Children and Religion Indicators.

Table 4.8: Work and the Gender Happiness Gap in the US among the White Population (GSS).

	(1) (TI)	(2) (WRKIX)	(3) (WRKIX2)	(4) (WRKIXG)	(5) (TFT)	(6) (TPT)	(7) (TUN)	(8) (TKH)
$Women$	0.2050***	0.2499***	0.2498***	0.2876***	0.2287***	0.3546***	0.2040	0.2944
	(0.0264)	(0.0288)	(0.0288)	(0.0270)	(0.0380)	(0.1077)	(0.1507)	(0.2197)
$Women \times Time$	-0.1961*	-0.3152***	-0.3115***	-0.2830***	-0.2368	-0.2788	0.7176	-0.1178
	(0.1116)	(0.1044)	(0.1035)	(0.1098)	(0.1675)	(0.2669)	(0.7272)	(0.1934)
$Men \times Time$	0.3056**	0.2656*	0.2645*	0.2375*	0.5066**	0.0676	0.4023	0.9648
	(0.1531)	(0.1365)	(0.1377)	(0.1277)	(0.2057)	(0.4163)	(0.4101)	(1.0510)
$ln(Income)$	0.1426***	0.1642***	0.1645***	0.1644***	0.1988***	0.1123***	0.1292***	0.1823***
	(0.0090)	(0.0085)	(0.0086)	(0.0084)	(0.0178)	(0.0223)	(0.0409)	(0.0221)
$HoursWorked$		0.0018***	0.0011	0.0027***				
		(0.0004)	(0.0008)	(0.0004)				
$(HoursWorked)^2$			0.0000					
			(0.0000)					
$Hours \times Women$				-0.0018***				
				(0.0005)				
Gap	0.5017***	0.5809***	0.5760***	0.5205***	0.7434***	0.3464	-0.3153	1.0826
	(0.1341)	(0.1390)	(0.1380)	(0.1367)	(0.1858)	(0.4936)	(0.6529)	(1.0178)
$Sample$	Full	Full	Full	Full	Full-Time	Part Time	Unemployed	At Home
$Controls$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	34637	34590	34590	34590	17691	3535	924	5902

[1] Controls include Education, Marital Status and Children

Table 4.9: Work and the Gender Happiness Gap in Germany (GSOEP).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(TI)	(WRKIX)	(WRKIX2)	(WRKIXG)	(TFT)	(TPT)	(TUN)
$Women \times Time$	-0.0291***	-0.0280***	-0.0279***	-0.0284***	-0.0351***	-0.0249***	-0.0358***
	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0054)	(0.0063)	(0.0039)
$Men \times Time$	-0.0298***	-0.0274***	-0.0271***	-0.0264***	-0.0311***	-0.0451	-0.0288***
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0031)	(0.0291)	(0.0071)
$ln(Income)$	0.2338***	0.2059***	0.2028***	0.2067***	0.1676***	0.1675*	0.2293***
	(0.0270)	(0.0267)	(0.0266)	(0.0267)	(0.0414)	(0.0937)	(0.0439)
$HoursWorked$		0.0034***	0.0080***	0.0046***			
		(0.0006)	(0.0016)	(0.0008)			
$(HoursWorked)^2$			-0.0001***				
			(0.0000)				
$Hours \times Women$				-0.0029**			
				(0.0012)			
Gap	-0.0007	0.0006	0.0008	0.0019	0.0040	-0.0201	0.0071
	(0.0034)	(0.0034)	(0.0034)	(0.0035)	(0.0060)	(0.0298)	(0.0079)
$Sample$	Full	Full	Full	Full	Full-Time	Part Time	Unemployed
$Controls$	No	Yes	Yes	Yes	Yes	Yes	Yes
N	57997	57997	57997	57997	27209	5974	21004

[1] Controls include Race, Education and Marital Status.

Table 4.10: Work and the Gender Happiness Gap among Retired Americans (HRS).

	(1) (TI)	(2) (WRKIX)	(3) (WRKIX2)	(4) (WRKIXG)	(5) (TFT)	(6) (TUN)
$Women \times Time$	-0.0152***	-0.0330	-0.0329	-0.0269	-0.0061	0.0953
	(0.0014)	(0.0474)	(0.0475)	(0.0478)	(0.0173)	(0.3802)
$Men \times Time$	-0.0147***	-0.0372	-0.0371	-0.0370	-0.0010	0.0959
	(0.0013)	(0.0467)	(0.0468)	(0.0468)	(0.0172)	(0.3616)
$ln(Income)$	0.0286***	0.0501*	0.0498*	0.0467*	0.0219**	0.3000**
	(0.0061)	(0.0260)	(0.0261)	(0.0261)	(0.0104)	(0.1250)
$HoursWorked$		0.0007	0.0022	-0.0028		
		(0.0017)	(0.0054)	(0.0018)		
$(HoursWorked)^2$			-0.0000			
			(0.0000)			
$Hours \times Women$				0.0082**		
				(0.0034)		
Gap	0.0004	-0.0042	-0.0043	-0.0101	0.0051	0.0006
	(0.0019)	(0.0108)	(0.0108)	(0.0106)	(0.0034)	(0.0579)
$Sample$	Full	Full	Full	Full	Full-Time	Unemployed
$Controls$	No	Yes	Yes	Yes	Yes	Yes
N	117935	4442	4442	36904	1039	

[1] Controls include Race, Education and Marital Status.

Table 4.11: Work Status and the Gender Happiness Gap in the Labor Force (US and Germany).

	(1)	(2)	(3)	(4)	(5)	(6)
	(TI)	(TWRKSTAT)	(TIW)	(TWWRKSTAT)	(TI)	(TWRKSTAT)
$Women$	0.1867***	0.1751***	0.2191***	0.1907***		
	-0.024	-0.0289	-0.0276	-0.0307		
$Women \times Time$	-0.0487	-0.0539	-0.2096*	=-0.2069*	-0.0382***	-0.0481***
	-0.1175	-0.1157	-0.1165	-0.1141	(0.0075)	(0.0078)
$Men \times Time$	0.4370***	0.4014***	0.3549**	0.3209*	-0.0388***	-0.0440***
	-0.1467	-0.1507	-0.1609	-0.1638	(0.0074)	(0.0076)
$ln(Income)$	0.1565***	0.1469***	0.1770***	0.1685***	0.2403***	0.2063***
	-0.0072	-0.0076	-0.0089	-0.0088	(0.0276)	(0.0271)
$Full\ Time$		0.0404**		0.0136		0.1059
		-0.0174		-0.0214		(0.0761)
$Part\ Time$		-0.0887**		-0.1341***		0.2175*
		-0.0424		-0.0452		(0.1170)
$Unemployed$		-0.4126***		-0.4624***		-0.2380***
		-0.0525		-0.0509		(0.0791)
$Community\ Service$						-0.2016**
						(0.0998)
$Full\ Time \times Women$		-0.0262		-0.0075		0.0068
		-0.0249		-0.0207		(0.0934)
$Part\ Time \times Women$		0.1261**		0.1632***		-0.2292*
		-0.058		-0.0592		(0.1260)
$Unemployed \times Women$		0.1775**		0.1958**		0.2066**
		-0.0792		-0.0762		(0.0920)
$Com.\ Service \times Women$						0.2529**
						(0.1184)
Gap	0.4856***	0.4553***	0.5645***	0.5278***	-0.0006	0.0041
	-0.1334	-0.1431	-0.141	-0.1508	(0.0034)	(0.0035)
$Controls$	Yes	Yes	Yes	Yes	Yes	Yes
N	41639	41639	34523	34523	57997	57997

[1] Controls include Race, Education and Marital Status. The GSS also includes a control for Age.

CHAPTER V

Conclusion

While vastly studied, there is no consensus as to what economists can learn form studying happiness. Many show skepticism toward the alleged virtues of this new method. Among other things, the concerns stem from the fact that subjective well-being measures are unreliable to the extent that they are affected by things such as the weather and stimuli as insignificant as finding a penny on a copy machine [Schwarz(1987)], [Schwarz and Clore(1983)]. The well-being approach implicitly moves economists away from "what people do" toward "what people say". The topic is increasingly apparent in the top journals but the idea that it is a valuable method of measuring individual welfare is far from consensual and the approach remains marginal. Alternatively, the enthusiasm for happiness data comes in part from the potential it offers for measuring the effect of non-traded goods on individual welfare and for tackling questions left unexplored due to lack of data.

This dissertation provides a critical review of the literature and, in particular, of the assumption of equivalence between subjective well-being and utility. Chapters II and III demonstrate the shortcomings of many of the interpretations of the Easterlin paradox and the existence of alternative interpretations, less challenging to the received knowledge in economics. Chapter IV explores the idea that well-being is a good and shows that this conjecture is consistent with the data.

Regardless of the amount of attention the field of happiness has received in recent years, economists understanding of subjective well-being is in its early stage. It is unquestionably a

promising field, the findings of which could have large effects in a wide range of domains. That said, it seems premature to suggests that nations should be governed by happiness surveys.

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