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**Andrew Clark**
**Sarah Flèche**
**Claudia Senik**

**JEL Codes: D31, D6, I3, O15**

**Keywords: Happiness, inequality, Economic growth, Development, Easterlin paradox**

PARIS-JOURDAN SCIENCES ECONOMIQUES
48, BD JOURDAN – E.N.S. – 75014 PARIS
TÉL. : 33(0) 1 43 13 63 00 – FAX : 33 (0) 1 43 13 63 10
www.pse.ens.fr

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE – ECOLE DES HAUTES ETUDES EN SCIENCES SOCIALES
ÉCOLE DES PONTS PARISTECH – ECOLE NORMALE SUPÉRIEURE – INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE

# The Great Happiness Moderation

Andrew Clark, Sarah Flèche and Claudia Senik (Paris School of Economics)*

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**Summary**. This paper shows that within-country happiness inequality has fallen in the majority of countries that have experienced a positive income growth over the last forty years, in particular in developed countries. This new stylized fact comes as an addition to the Easterlin paradox, namely that the time trend in average happiness remains flat during episodes of long run income growth. This mean-preserving declining spread of happiness happens via a reduction in both the share of individuals who declare a very low and a very high level of happiness. The rise in income inequality moderates the fall in happiness inequality, and reverts it when it becomes too important, notably in the US starting in the 1990s. Hence, if raising the income of all will not raise the happiness of all, it will at least harmonize the happiness of all, provided that income inequality is not too high. Behind the veil of ignorance, this feature would certainly be considered attractive to risk-averse citizens.

**Keywords**: Happiness, inequality, economic growth, development, Easterlin paradox.

**JEL codes**: D31, D6, I3, O15

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# I. Introduction

What should the populations of developing countries expect from income growth and development? Easterlin and his co-authors have shown that, paradoxically, their self-declared happiness will not increase, in average, over the long run. But what about the distribution of happiness? Can they at least count on the social harmonization of well-being?

The current paper does not address the evolution of average happiness, and takes for granted the stylized fact that constitutes the Easterlin paradox (the flatness of happiness curves over the long run). Rather, it takes advantage of the individual dimension of available datasets and analyzes the evolution of the distribution of happiness over time. In other words, whereas Easterlin was looking at the first moment of happiness over time, we are looking at the second moment.

From a policy point of view, the distribution of happiness across the inhabitants of a country is an indicator of interest, although a purely utilitarian view would maximize total happiness. First of all, for risk-averse agents, happiness inequality is certainly a bad, and behind the veil of ignorance they would certainly choose a society where happiness is more evenly distributed. Secondly, what egalitarian policies are ultimately trying to harmonize is the welfare of their citizens, not just their incomes, the latter being just a proxy of the former. *De facto*, several authors have questioned the relevance of income inequality as measure of social inequality: Veenhoven (2005b) for instance, advocates for measuring the inequality in longevity and happiness instead of income. Non-egalitarian governments may also attempt to equalize happiness because of the risk of potential social tension and unrest that is borne by the inequality of well-being. Indeed, in a political economy framework, discontent theories (Tullock 1971, Gurr, 1996) hypothesize that the expected gains (hence the likelihood) of a

rebellion are approximated by the happiness gap between the most well-off and the most disadvantaged. Our first objective is thus to establish whether development policies bear the promise of a reduction of happiness gaps. Note that the dispersion of happiness within countries is typically twice higher than across countries. For instance, in the World Values Survey (1981 to 2008), the typical average standard deviation of life satisfaction (10-point scale) within a cross-section is 2.14 but only of 1.01 across countries. Hence, reducing within country inequality is a not a futile objective.

The other motivation of this research is to contribute to the understanding of the Easterlin paradox. Several interpretations have been proposed for the stability of average happiness over the long run. The first one points to the concavity of the happiness function of income, which implies that the unfolding of income inequality is bound to reduce the mean level of happiness over time (Stevenson and Wolfers, 2008, 2011, 2010). Then come more "behavioral" hypothesis, proposed by Easterlin himself, among which the most prominent are social comparisons and adaptation. Finally, because happiness is rated on a bounded scale, it is likely that some "rescaling" happens, i.e. people change their interpretation of the steps of the happiness scale as their level of affluence increases. All these hypotheses are potentially consistent with the steadiness of average happiness overtime; but can they also explain the evolution of the distribution of happiness over time?

We examine countries that have experienced episodes of uninterrupted income growth over an extended period, between 1970 and 2010, and whose happiness curve is flat. We uncover an inverse dynamic relationship between GDP per capita and happiness inequality. Over the "long run", happiness inequality decreases in countries that experience a positive income growth. This inverse relationship is also true for point of time correlations: across countries surveyed by the *World Values Survey* (1970-2008), a higher level of income per inhabitant is associated with a lower standard deviation in subjective happiness. We focus on developed

countries and study particularly those for which we have long yearly series of happiness surveys: Australia (HILDA), Germany (GSOEP), Great-Britain (BHPS) and the United-States (*General Social Survey*). These data confirm the declining spread of happiness over time (except in the end period in the US). This mean-preserving declining spread of happiness happens via a reduction in both the share of individuals who declare a very low and a very high level of happiness. To paraphrase Easterlin, our findings suggest that raising the incomes of all will not increase the happiness of all, but will reduce its variance, hence the risk of extreme unhappiness.

This harmonization in well-being is not driven by the evolution in income inequality within each country; on the contrary, income inequality is on the rise during the considered period. These two opposite forces seem to coexist until a certain point. In the United States, when income inequality becomes too large, in the 1990s, it reverts the downward trend in happiness dispersion. In the mean time, over the considered period, happiness gaps between certain categories of the population (gender, marital status) tend to decrease, as does within-groups happiness inequality in general.

Turning to the various theories that have been proposed to explain the Easterlin paradox, we find that social comparisons and simple time-dependent adaptation are not sufficient to account for these new stylized facts (i.e. a mean-preserving declining spread of happiness over time). In order to do so, it is necessary to consider more subtle concepts of adaptation (*à la* Maslow for instance) or rescaling effects. The homogenizing influence of the public good externalities of modern growth could also play a role.

## Literature

Before us, other authors such as Veenhoven (2005b) and Kalmjin and Veenhoven (2005) noticed a drop in happiness inequality within developed countries over the last decade. Veenhoven (2005b) found that in spite of increasing income inequality, happiness inequality has fallen in EU countries (surveyed in the EuroBarometer), over the years 1973-2001. He also noticed that the dispersion in happiness is smaller in "modern nations" than it is in traditional ones. Other authors have documented the decline of happiness inequality over time in the US or Germany from the 1970s to the 1990s, with a rebound in the 1990s. These include Stevenson and Wolfers (2008b), Ovaska and Takashima (2010), Dutta and Foster (2011) and Becchetti, Massari and Naticchioni (2011).

Stevenson and Wolfers (2008b) and Dutta and Foster (2011) both study the evolution and decomposition of happiness inequality in the United-States, using the *General Social Survey*. The former analyze the evolution of happiness inequality between 1972 and 2006. They observe a fall in happiness inequality by 21% from the 1970s to the 1990s, about one-third of which is reversed in the subsequent decade. They also decompose the evolution in happiness inequality. They show that the happiness gap between men and women has vanished and that two-thirds of the black-white happiness gap has disappeared. In parallel, education and age gaps have widened between 1972 and 2006. Generally, within group inequality has declined substantially until the 1990's, but resumed afterwards. The parallel increase in income inequality does not seem to have impacted happiness inequality. They suggest that "*the real reason for today's lower level of happiness inequality is to be found in a pervasive decline in within-group inequality experienced by even narrowly defined demographic groups*" (Stevenson and Wolfers, 2008, pS34). The authors conclude to the important role for non-pecuniary factors in shaping the well-being distribution. In particular, they stress the

institutional and technological changes (e.g. anti-discrimination and affirmative actions, divorce laws, birth control, etc.) that have increased the autonomy and freedom of choice of individuals, and raised the opportunities open to minorities. Dutta and Foster (2011) focus on the methodological aspect of measuring the evolution in inequality of happiness as an ordinal variable. They apply a median-centered approach developed in a former companion paper and decompose happiness inequality across gender, race and religion. Their findings are close to those of Stevenson and Wolfers, except for their conclusion that "*the progress made in the 1990s in reducing happiness inequality has been wiped out in the 2000s*".

Becchetti et al. (2011) decompose the trend in happiness inequality in Germany (both East and West), from 1991 to 2007, using the GSOEP. They use RIF regressions[2] and decompose the variance of happiness between two periods (1991-1993 and 2005-2007). One of their main findings is the null role of the change in the coefficients: the return to drivers of happiness inequality are invariant over time. They also find that income inequality is not the main source of happiness inequality. Finally, their results suggest that the main determinant of happiness inequality is the variance within categories of education (within variance is lower in higher education, and the weight of higher education people increases over time). The common findings of all these papers are the utmost importance of within-categories variance and the null influence of income inequality on happiness inequality.

Other papers have looked at the variation of happiness inequality across countries, instead of over time. In a special issue of the *Journal of Happiness Studies* dedicated to "the Inequality of Happiness in Nations" (Diener et al. eds. 2005), Ovaska and Takashima (2010) run aggregate level regressions of happiness inequality over socioeconomic controls and income

[2] Recentered Influence Function regressions are a generalization of the Oaxaca-Blinder (1973) procedure to other distributional parameters beyond the mean. It allows splitting the total change in happiness inequality into the change in the distribution of happiness determinants (composition effects) and the change in the return on these determinants (coefficients). It can also go down to detail the contribution of each determinant.

distribution as well as measures of economic and political freedom taken from the Fraser Institute and Freedom House. They identify income inequality, health inequality and the poor quality of institutions as the main correlates of happiness inequality within countries. Ott (2010) also describes the pattern of institutional correlates of happiness inequality across a set of 131 nations in 2006.

In this paper, we also use the *World Values Survey*, the German panel (GSOEP), as well as the American General Social Survey (GSS). In addition, we use the British Household Panel Survey (BHPS) and the Australian HILDA. We analyze the evolution of happiness inequality that we measure using the standard deviation divided by the mean level of happiness. We find, like the papers cited above, that the dynamic evolution of income inequality is not a good predictor of the evolution in happiness inequality. We uncover a general fall in the spread of happiness in all the considered countries, although in Germany and the US, this trend breaks in the 1990s. Although Beccheti et al. (2011) document a rise in happiness inequality in Germany between 1991 and 2007, we take a longer view and obtain a different picture, whereby happiness inequality decreases strongly in the 1980s and then fluctuates around a flat trend in the 1990s.

The main interest of this paper is the distribution of happiness, not the distribution of income. A considerable number of papers have discussed the relationship between income inequality and happiness; most have discovered a negative association, but there is no consensus on the strength of this link (see Clark et al. 2008 or Senik 2009 for a survey). Other papers in the realm of the happiness literature have documented the negative correlation between macroeconomic volatility and happiness over time (Wolfers, 2003; di Tella and MacCulloch, 2003). Finally, macroeconomists have uncovered a “great moderation” in the volatility of the business cycle, starting in the 1980s (Stock and Watson, 2002; Gali and Gambetti, 2009). Although this is a different issue, macroeconomic volatility could be related to happiness

inequality if income inequality is compounded by inequality in income volatility, i.e. if health, unemployment and retirement risks are concentrated on poorer households (as noted by Stevenson and Wolfers, 2008a).

## II. Data and methods

### II. 1 Data

This paper uses the five waves of the World Values Survey (WVS, 1981-2008)[3], covering 105 countries, including high-income, low-income and transition countries. We select time series data that correspond to periods of positive income growth (60 countries)[4]. Happiness measures were mostly taken from the WVS and the *European Values Survey* but when happiness data was missing, we used information from the ISSP and the 2002 *Latinobarometer*. We also analyze country specific surveys, such as the *British Household Panel Survey* (BHPS, 1996-2008), the German *Socio-Economic Panel* (GSOEP, 1984 - 2009), the American *General Social Survey* (GSS, 1972-2010) and the *Household, Income and Labour Dynamics in Australia* (HILDA, 2001-2009). All figures and tables are based on weighted samples.

The Happiness and Life satisfaction questions were administered in the same format in all these surveys but with different scales: 1-3 in the GSS, 1-10 in the WVS, 0-10 in the GSOEP and the Australian HILDA, 1-7 in the BHPS. The wording of the Life satisfaction question in the WVS was: "*All things considered, how satisfied are you with your life as a whole these days?: 1 (dissatisfied)….10(very satisfied)*". In the GSOEP, it was "*How satisfied are you with your life, all things considered?*": 0 (*totally unsatisfied*) … 10 (*totally satisfied*). The

[3] These datasets are available at http://worldvaluessurvey.org.
[4] For a number of countries, we only have one point of time observation.

BHPS survey asked "*How dissatisfied or satisfied are you with your life overall?*": 1 (*not satisfied at all*) … 7 (*completely satisfied*)". The wording of the Happiness question in the GSS was: "*Taken all together, how would you say things are these days - would you say that you are very happy, pretty happy, or not too happy?*". We do not need to harmonize these scales, as we look at the evolution of the variance of happiness over time within countries. The surveys cover representative samples of the population of participating countries, with an average sample size of ten-fifteen thousand respondents in each wave. As is the rule, we select people aged between 18 and 65 years old; we also drop observations corresponding to a declared income below 500$ per year.

We use the American *General Social Survey* because it is the only long run survey containing a happiness or life satisfaction question in the United-States. However, this data is not really adapted to our investigation, as the happiness question only allows three possible answers (very happy, pretty happy, not too happy). This small happiness scale is obviously not fit to the analysis of the variance. However, because the Easterlin paradox partly relied on American data, and because it is difficult to establish a conjecture without trying to verify its relevance in the United-States, we do report the results based on this data, although we consider them with greater caution than otherwise.

It is natural to try to relate the happiness spread to the distribution of household income within countries. Ideally, we would like to use the net disposable income after tax and transfers, which is probably most closely related to (consumption and) well-being. A measure of the annual disposable net combined income after receipt of public transfers (Government pensions and benefits) and deduction of taxes is indeed available in the German and Australian surveys. This is not the case in the BHPS, where household income is measured as the combination of labor income, non-labor income and pensions for all household members, in the previous year, but before taxes. Identically, the GSS contains a measure of "total family

income", i.e. all types of income from all sources, for all members of the household, before taxes, in the previous year.

Finally, we use measures of GDP per capita taken from Heston, Summers and Aten – the Penn World Table. We also use indicators, which are available in the World databank, such as social expenditure, rule of law, voice and accountability and control of corruption[5]. Voice and accountability measures the extent to which citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and free media. Rule of law describes the quality of contract enforcement, of the police and the courts, as well as the likelihood of crime and violence. Control of corruption measures the extent to which public power is exercised for private gain.

## II.2 A cardinal measure of happiness inequality

We measure happiness inequality as the standard deviation of self-declared happiness across the inhabitants of a country in a given year. In order to avoid the effect of scale dependence, we divide it by the mean value of happiness in the corresponding year (the two measures are homogenous)[6]. Self-declared happiness is a choice on a proposed scale, hence equality is reached when all respondents choose the same rating, and inequality is highest when the distribution of individuals on the scale is uniform. Flat distributions are more unequal that those with a high top; wide flat distributions are more unequal than narrower flat ones; and multi-modal distributions are more unequal than unimodal ones (see Kalmijn and Veenhoven,

[5] http://info.worldbank.org/governance/wgi/index.asp

[6] One can refer to the general discussion by Kalmjin and Veenhoven (2005a) about the adequate measure of happiness inequality. The authors conclude to the superiority of the standard deviation. They point out that the Gini index of inequality is not appropriate in the case of the ordinal measure of happiness. Indeed, the Gini measures the share of total income that is not distributed equally, but happiness is an intensity variable, not a capacity variable: it cannot be appropriated entirely by one person or distributed flexibly amongst individuals. The same is true of the Theil's index of inequality. They also discuss the drawbacks of interquartile range or the proportion outside the modus.

2005). Standard deviation is consistent with these properties, as it captures the notion of inequality in the sense dispersion.

Of course, calculating the standard deviation (and the mean) of happiness implies treating this variable as a continuous cardinal measure, with equidistant steps, which is admittedly an incorrect approximation, but one that is common to researchers of the field, following van Praag (1991, 2007), Ferrer-i-Carbonell and Frijters (2004), or Van Praag and Ferrer-i-Carbonell (2004, 2006). Van Praag (1991) has shown that respondents translate the ordinal scale into a numerical scale. They may do it in a different way, but there is no reason to expect that this heterogeneity is correlated with the error term of a regression (Frey and Stutzer 2002a). Vignettes (Beegle et al. 2011) have shown that it is not correlated with happiness determinants, nor with the residual of the regressions. It has also been shown that the bias introduced by the continuity assumption is small when the scale contains a large number of categories or steps, which is the case of all the datasets that we use, except the GSS (which only contains three modalities).

Dutta and Foster (2011) criticize the approach of treating the ordinal happiness scale as a cardinal one because, depending on the chosen scale, the level of inequality calculated will vary, and so will the ranking of various societies or groups in terms of happiness inequality. Deviations from the mean will not be order preserving because the mean itself is not order preserving under scale change. Instead, they propose scale independent concepts that capture the concentration of the distribution around the median value, as well as a mean-based inequality measure, which is the difference between the mean value of the upper half and the mean value of the lower half of the population.

Note that our findings are exactly identical to Dutta and Foster's and more generally to the papers cited above, which use different dispersion measures. To be safe, we also use the index

of ordinal variation (IOV, see Berry and Mielke 1992), a measure of polarization designed for ordinal measures, which describes the distribution of the population over a number of predetermined ordered categories and takes value 0 when all observations fall into one category and 1 in case of extreme polarization. In order not to duplicate the tables, we just display the similarity of the two measures (the standard deviation and the IOV) for each year of each database (section A2 in the Appendix).

## III. Income growth creates a mean-preserving spread in happiness

Before we turn to the dynamic relationship between income and happiness inequality, we briefly look at the static cross-sectional relationship between these magnitudes, taking the last available year for each country of the World Values Survey. As noted in Veenhoven (2005b), Kalmjin and Veenhoven (2005) and Clark and Senik (2011), cross-country analysis produces a striking observation: richer countries have both higher average scores and lower standard deviations of life satisfaction (Figure 1.A). The typical relationship implies that a doubling of GDP per capita is associated with a 10% reduction in happiness inequality[7]. A RIF regression[8] of the standard deviation of happiness over log GDP per capita, controlling for demographic variables and year fixed-effects (Table 1.A) confirms this result. Moreover, the negative gradient is a little bit steeper in richer countries (where GDP per capita is above $8000) than it is in poor countries, as illustrated by Figure 1.B.

[7] 0.049*ln(2)*mean happiness=0.23, as the mean value of happiness in the WVS is in the range of 6.7 and the standard deviation in happiness is in the range of 2.3.

[8] See Firpo et al. (2009) for a presentation of the method.

## III. 2 Dynamic evidence from the World Values Survey

Turning to the dynamic relationship between GDP per capita and happiness inequality, we start with the *World Values Survey*, from which we keep countries that are observed at least twice, in at least five years distant points of time, and experience strictly positive GDP growth. Hence the graphs show the evolution of the standard deviation in happiness over periods of at least 5 years of growth. Figure 3.A illustrates the relationship between the long-run first-differences in income per capita and in happiness inequality. Each point refers to a country: the x-axis corresponds to the variation in GDP per capita between the two extremes dates of the period of growth and the vertical y-axis represents the variation in the standard deviation in happiness during the same period. The relationship is clearly negative: happiness inequality falls when GDP per capita increases over (at least five years of) time: a 10% increase in GDP per capita is associated with a fall in the standard deviation in happiness by 0.02 points, i.e. about 1 % of the typical standard deviation in happiness[9]. Figure 3.B reproduces the same relationship in the sub-sample of Western developed countries only.

We run a RIF regression of the standard deviation of happiness over log GDP per capita, controlling for various demographic variables and for country fixed-effects. The results confirm the negative correlation between GDP per capita and the normalized standard deviation in happiness over time, in the countries covered by the WVS (column 1 in Table 1.B**).** The partial coefficient of correlation between the two magnitudes of interest is similar to that of the regression line of Figure 3.A.

In summary, contrarily to the relationship between average income and average happiness that was examined by Easterlin, there is not contradiction between the point of time and the

[9] It will be lower by 0.043*ln(1.1)*mean happiness.

dynamic evidence concerning the negative correlation between average income and happiness inequality.

A close look at the World Values Survey shows that the trend in happiness inequality over time (at least five years) in more clearly descending in Western developed countries than in Asian countries or Latin America. Hence we now focus on developed countries and turn to country specific surveys.

### III.3 Country specific surveys

Having looked at the repeated cross-sections of the *World Values Survey*, which contain few points in time and few observations per cross-section, we now turn to country-specific surveys, which contain tens of thousands of observations in each year, and are repeated almost every year. Figures 4.A to 4.D display two series of graphs for Great-Britain, Germany, the US and Australia. One plots the dynamic evolution of average happiness, log GDP per capita and the mean log household income (declared in household surveys), whereas the other plots the standard deviation of happiness and GDP per capita.

The curve of the average log of individual income, which is calculated from the surveys, is below that of GDP per capita for two reasons: first, it is a usual feature that is due to the fact that surveys typically miss the top incomes of a country (Atkinson et al. 2011). Second, it is expected that the average log income is lower than the log average income if income distribution is skewed to the left: the higher the inequality in income distribution the higher the wedge between the two magnitudes. We plot these two variables on the same graph because one of the questions of the literature is whether self-declared individual happiness is a log function of income (see section IV.1). The graphs clearly show that the dynamics of average happiness are clearly distinct from that of mean log income.

All these graphs show similar trends. First, the Easterlin paradox is reproduced: the trend in average happiness remains flat over time in spite of the upward trend in income growth (whether log of mean or mean of logs). Second, the trend in the standard deviation in happiness is negative. The only exceptions are Germany, where the downward trend breaks in the 1990's, and the US where the trend rises again after 1990.

We also add some graphs pertaining to developed countries from the *World Values Survey*, which meet three requirements: periods of positive income growth, with information for points of time that are at least ten years apart, and correspond to a constant happiness trend. As shown by Figures 4.E, all the countries that meet these criteria present a downward trend in happiness inequality (France, Italy, Spain, the Netherlands, Norway).

Let us underline that the negative relationship between the standard deviation in happiness and income per capita cannot be attributed to stochastic dependency or scale dependency, as the latter would imply that in richer countries where average happiness is higher, the standard deviation in happiness is also higher. The negative correlation between average happiness and happiness dispersion thus has to be interpreted as revealing an "intrinsic dependency" rather than a statistical one (in the words of Kalmijn and Veenhoven, 2005). On the other hand, the authors underline that on a bounded scale, the maximum measure of inequality is reached when the average value is in the middle of the scale, so that the maximum standard deviation is smaller for higher levels of average happiness. However, the actual measures of standard deviation that we obtain (in the range of 1.5-2.5) are below their maximum possible values (around 7).

### The vanishing of the extreme edges of happiness

In order to produce the two stylized facts uncovered, i.e. the constant trend and the falling standard deviation of happiness, we expect to see a concentration of the happiness level

declared by respondents over time. As show by Figures 5.A to 5.D, it is indeed the case that over the time period considered, the share of respondents who declare a very low level of happiness (the lower rungs) or a very high level of happiness (the top rungs) shrinks, whereas more respondents choose the middle of the scale. This is illustrated both by the histograms representing the distribution of self-declared happiness in the first and the last years of each survey, and by the year-on-year evolution in the proportion of respondents who choose high, average and low scores. Both types of graphs make it obvious that there is a convergence to the mean over time in all of the countries under review.

Hence, it seems that three concomitant stylized facts characterize the recent period of growth, especially in developed Western countries: (1) the rise in average income per capita over time, (2) the stability of average happiness over time, (3) the fall in happiness inequality over time.

### III. 4 The role of income inequality

The decline in the happiness spread is surprising, given that the period under study is one where income inequality is known to have increased considerably, starting in the 1980s (Dustmann et al. 2008; Atkinson et al. 2011). If individual happiness depends on income, one should expect that the distribution of happiness become more unequal as income inequality rises.

Figures 6.A to 6.D show the dynamic evolution in the standard deviation of income and in happiness in each country: income inequality follows an upward trend in all countries under review (but not happiness inequality). In most countries under review, income inequality between quintiles has increased. The average income of the upper quintile has increased much

more than that of lower quintiles[10]. The poorest quintile has often remained at the same level over the period. But when we plot the trends in happiness of the different income quintiles of the population of each country over time, we do not observe a divergence in the happiness of the different quintile groups. In the Unites-States and in Germany, between groups inequality in happiness initially falls (until 1990) but resumes afterwards in Germany. This is due to the fall in the happiness of the poorest quintile. In the United-States, there is a more general movement of divergence starting in the 1990's. Moreover, in all countries, within quintile dispersion fall dramatically over time, although, again, within-group inequality increases after 1990 inside the poorest quintile in Germany and the US. Hence, the general picture is one of an increasing income inequality, which is not matched by a rise in happiness inequality.

Should one conclude that the dynamic evolution of happiness inequality is totally independent from that of income, as suggested by Stevenson and Wolfers (2008b), Dutta and Foster (2011) and Beccheti et al. (2011)? To answer, we run a RIF regression of the standard deviation of happiness over the log GDP per capita and the mean log deviation (see Stevenson and Wolfers, 2010). Table 1.A shows that happiness inequality increases over time with mean log deviation in income but falls with average income. We take this as evidence of two opposite forces, which could explain the rebound in happiness inequality at the end of the period in Germany and the US. Based on the coefficients of the estimates, it is easy to see that in order to neutralize the impact of a rise in GDP per capita by 30%, the mean log deviation should increase by more than 0.05 points, i.e. about 35% of its average value in the sample[11].

[10] See also the study of the United-States by Layard, Mayraz and Nickell (2012).

[11] It should increase by more than 0.89*ln(1.3) / 4.264=0.05. The mean log deviation in the sample is in the range of 0.14.

In sum, the fall in happiness inequality over time is not driven by a parallel reduction in income inequality[12]. On the contrary, income inequality is on the rise in all the countries under review, and this act as a countervailing force. This force is not powerful enough to revert the process of happiness equalization, except in the United-States at the end of the period.

### III. 5 Decomposing happiness inequality into micro and macro factors

If happiness equalization over time is not driven (but rather counteracted) by income distribution, could it be due to a composition effect, i.e. an increased socio-demographic homogeneity of the population?

We start with a visual illustration of the evolution of average happiness by socio-demographic groups, and of the within dispersion of happiness inside each group. As shown by Section A3 in the Appendix, happiness gaps between groups increase for education (except in Australia) and decrease for gender and marital status (before reverting in Germany and the US, after 1990). The evolution of the gaps between age groups and employment status groups is quite different across countries. However, a common trend is that happiness inequality declines over time in all countries within age, education, gender, marital status and employment status categories, although this statement must be qualified, as most of this downward evolution in within-group happiness spread is reverted in the US and Germany after 1990. In sum, the general trend is that happiness dispersion within different demographic groups in on the fall, as uncovered by Stevenson and Wolfers (2008a) and Becchetti et al. (2011).

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[12] This may be because the impact of income inequality on happiness inequality is channeled though consumption inequality. Indeed, the recent evolution in consumption inequality is the object of a vivid debate amongst academics. Concerning the US for instance, most authors observe a increase in consumption inequality in the 1980s, but Krueger and Perri (2006) find on the opposite, that consumption inequality has been flat or declining in the 1990's and has remained incomparably lower than the increase in income inequality (see Stevenson and Wolfers, 2008b for a review).

RIF estimates of the variance in happiness in each country illustrate how the composition of the population affects happiness inequality. However, Table 1.B shows that GDP per capita and income inequality affect the time change in happiness inequality beyond the impact of demographic change and beyond the change in within group variance (socio-demographic controls). As shown by Table 1.A, this also is true in cross-section estimates (controlling for year fixed-effects).

In summary, the fall in happiness inequality cannot be traced back to changes in the socio-demographic composition of the population over time, although within groups and between groups happiness spread has changed over time. Even holding constant the socio-demographic composition of countries, average income growth is associated with a decline in happiness inequality.

## IV. Interpretations

Any theory explaining the evolution of happiness must account for three joint evolutions which are typical of Western developed countries: (1) the rise in average income per capita over time, (2) the stability of average happiness over time, (3) the fall in happiness inequality over time.

We have shown that this cannot be explained by the evolution of income inequality or by a structural change in the demographic composition of the surveyed countries. We now review the existing theories concerning the link between income and happiness in order to select those that can account for this pattern.

## 1. Happiness as a log function of (absolute) income and nothing else

Stevenson and Wolfers (S&W) have argued that the relationship -both point of time and dynamic- between income and happiness follows a stable log function. Is this description consistent with our stylized facts?

Suppose, to start, that average income growth leaves the distribution of income invariant, i.e. all incomes increase in a proportional way. In this case, average happiness would rise (although maybe moderately because of concavity) and the standard deviation in happiness would remain constant (because standard deviation is translation invariant and the log of a product is a sum of logs). Hence, in order to produce the stylized facts, the distribution of income has to change. But the only evolution in the distribution of income that would generate a mean-preserving declining spread in happiness would be a rise in the income of the poor matched by a greater fall in the income of the rich. This concentration of incomes around the median would indeed leave average happiness constant and reduce its dispersion. However, this evolution is not observed in any of the countries under review… the opposite is true.

### Actual and counter-factual distributions of happiness

A direct empirical test of S&W consists in asking whether the happiness function, estimated at the beginning of a period of growth, in each country, correctly predicts the distribution of happiness under the modified distribution of income (and demography) at the end of the period. This should be the case if individual happiness were a stable function of individual income. However, this simulation exercise shows that the actual distribution of happiness at the end of the period is systematically different from the predicted one. It turns out that the actual distribution of happiness is always more concentrated around the mode, with thinner

tails of the distribution, than would be predicted (Figures 7.A to 7.D). In particular, in all countries under review, if the happiness function were stable over time, the number of people on the highest level of the proposed scale would be much higher than it actually is.

## 2. Social comparisons

Moving to more behavioral explanations, Easterlin proposed two main explanations: social comparisons and adaptation over time. We start with social comparisons i.e. the hypothesis that income is at least partly relative. Hence, we assume that happiness depends on log(y, y/y*), where y is individual income, and y* is reference income. We know, as show by Figures 6.A to 6.D, that the average income of all quintiles increase over the period, that the income of the top quintile sky-rockets, leading to higher income inequality, and that the standard deviation of happiness within quintiles diminishes (except in the GSS, where it increases for the poorest quintile after 1990).

In these conditions, if everybody compares to an ever increasing top income category, i.e. y* increases over time by a comparable amount for everybody, this will amount to a negative translation of utility for everybody (except the richest), hence an increase in the standard deviation in happiness. Accordingly, van Praag (2011) notes that income inequality should create an increase in happiness inequality because of envy issues. Hence, *a priori*, in the presence of rising income inequality, income comparisons should lead to an increase in the standard deviation in happiness, not to a fall.

To be sure, *in abstracto*, there are configurations that could lead to a concentration of happiness, but they do not correspond to the actual evolution in income distribution. Suppose for instance that the utility of income is only partly relative, that everybody compares to the average or to the median income earner, and that the income of the middle group increases, whereas the income of the extremes do not change, then the additional happiness of the

middle class will be offset by the reduced happiness of the extremes. Reproducing the same reasoning in a "fractal" way, suppose, alternatively, that society is divided in separated groups, with comparisons happening inside groups but not across groups, and people compare to the average income earner inside each group. Then a similar concentration of income inside each group would produce the same result. Another possibility is that everybody compares to the poorer group (which itself compares to absolute poverty), and the poorer group becomes richer over time whereas all the other groups remain constant: this pro-poor growth could be consistent with our stylized facts.

However, empirical studies have shown that comparisons are mostly upward (see Clark et al. 2008 for a survey) and (as already said) the evolution in the distribution of income over the last three decades has not consisted in the enrichment of the middle class or the poorest, but rather in the enrichment of the top income-earners. In order to produce the observed stylized fact, it would thus take a subtle evolution of incomes and comparisons, whereby the richer would compare to an ever-furthering target, and the poor would progressively close the gap with their target group. However, we do not observe such a convergence in the average happiness of the different quintile of income inside each country (Figures 6.A to 6.D). Hence the idea that the dynamic evolution in happiness should be attributed to income comparisons is not compelling.

## 3. Adaptation

The second behavioral explanation of the Easterlin paradox points to adaptation. In a nutshell, the idea is that people's aspirations increase following their material affluence, and because

satisfaction depends on the gap between achievement and aspirations, it does not change (because the gap remains unchanged)[13].

Adaptation implies that there is a negative effect of past income on the utility of current income[14]. Di Tella and MacCulloch (2008) or Stutzer (2004) have shown evidence of such habituation to past income levels, showing that the total impact of lagged and current income is nil. It is not easy to see how adaptation could generate a fall in the inequality of happiness (with a constant mean). For instance, happiness equalization could happen if adaptation is faster at the top of the income ladder and slower at the bottom, but in this case, the mean level of happiness would increase.

Would more sophisticated concepts of adaptation be consistent the observed stylized evolution in the average level and distribution of happiness during episodes of growth?

### Not a bliss point

Another explanation for the Easterlin paradox, which is rejected by Easterlin himself (as well as Stevenson and Wolfers 2008b, and Deaton 2008), but accepted by other scholars, such as Layard (2005), Inglehart (1997), Inglehart et al. (2008), di Tella et al. (2007) and more recently Proto and Rustichini (2012), is that the positive gradient in happiness disappears after a certain bliss point[15], which would be located around ten or fifteen thousand dollars (Layard,

[13] If adaptation is full-blown, then why do different layers of the income scale have different levels of self-declared happiness? Easterlin (2001) hypotheses that all children and teenagers live together at the beginning of their lives and thus compare to each other and to each other's family wealth, which leads them to different happiness levels. Then, in adulthood, social groups are separated and do not compare to each other anymore, but remain on their specific satisfaction path.

[14] Another type of adaptation is the process of changing aspirations, not because of own past experience, but because of other people's standard of living, a concept that is close to comparisons (see section IV.2).

[15] A question is of course whether this bliss point would not increase with the level of affluence of the considered society. For instance, Proto and Rustichini do calculate that the level of this threshold is around $26000-$30000 for all countries of the *World Values Survey*, but between $30000-$33000 for countries of the European Union.

2005; Frey and Stutzer, 2002,), or $26 000- $33 000 (Proto and Rustichini, 2012). The hypothesis of a satiation point is a particular case of the process of adaptation, as it postulates a process of complete adaptation above a certain income threshold.

Although the hypothesis of a satiation point is controversial, one can ask whether it would explain the stylized facts analyzed in this paper. It seems to us that this is not the case. Indeed, if the rich alone get richer (but not happier because they are beyond the bliss point), this will not reduce the inequality in happiness. If all incomes increase and progressively reach the point beyond which enrichment ceases to produce happiness, then average happiness would rise until everybody in the country has reached the bliss point. The same is true if the poor alone get richer.

### Maslow and post-modern values

Another more sophisticated version of adaptation is the evolution of needs and aspirations à la Maslow. Maslow's (1943, 1954) proposed a model of development of human needs, motivations or aspirations, by stages. The most basic needs are (1) physiological needs (air, food, drink, shelter, warmth, sex, sleep) and (2) safety needs (protection, security, order, law, stability, limits); then come more elaborate needs such as (3) belongingness and love (family, affection, relationships, work group), (4) esteem (achievement, status, responsibility, reputation), and (5) self-actualization (personal growth and fulfillment). The two first types of needs create physiological distress in case of deficiency, and physiological bliss when they are fulfilled whereas the four subsequent needs are "meta-motivations" of a superior order. Maslow's theory suggests that the most basic level of needs must be met before the individual strongly desires (or focus motivation upon) the secondary or higher level needs but allows the five types of needs to partly overlap. A translation of Maslow's theory into the framework of economics would be that subjective well-being depends on the multidimensional gap between

needs and attainments, but with weights attached to each dimension varying with one's context and degree of affluence. As people fulfill their basic needs, they take them as granted, and cast down the importance that they attach to this dimension. They start attaching more importance to the other dimensions for which the gap between their needs and their achievements is still large. Hence Maslow's theory implies a "preference drift" (van Praag, 1971) not only in the dimension of income, but involving many other dimensions of life.

An important point is that the four higher needs may be much more difficult to fulfill than the two basic needs. This recoups the opposition between survival and living. It is quite obvious that being happy about the meaning of one's life is less straightforward than being happy to survive. Inglehart (1997, pp. 64-65) has developed and illustrated this opposition between survival societies and modern societies: "*the transition from a society of starvation to a society of security brings a dramatic increase in subjective well-being. But we find a threshold at which economic growth no longer seems to increase subjective well being significantly. This may be linked with the fact that, at this level, starvation is no longer a real concern for most people. Survival begins to be taken for granted […] At low levels of economic development, even modest economic gains bring a high return in terms of caloric intake, clothing, shelter, medical care and ultimately in life expectancy itself. […]. But once a society has reached a certain threshold of development … […] non-economic aspects of life become increasingly important*…". He proposes an explanation in a recent paper (Inglehart 2010, p 353): "*Economic development increases people's sense of existential security, leading them to shift their emphasis from survival values towards self-expression values and free choice. [..] Emphasis on freedom increases with rising economic security*".

This theory implies that, as societies develop, the share of the population that fulfill their basic needs increases and the share of the population who is still facing a risk of survival shrinks. However, as long as there remains a fringe of precariousness in society, the poor may

feel happy to escape it and their aspirations may remain a mix of material and non-material needs. This would explain why average happiness does not increase while the share of the extreme steps of happiness shrinks (people are more difficult to satisfy, but the poor are happy to escape material distress).

A recent paper by Proto and Rustichini (2011) suggests that neurotic people at the top of the income scale are driving the Easterlin paradox, because of their particular tendency to adapt. Even absent this assumption (about neuroticism), it is likely that growth and technological progress increase the possibilities and aspirations of the wealthiest. In parallel, development comes with an extension of the basic goods (corresponding to basic needs 1 and 2) available to the population. Typically, modern growth is associated with a better general level of education and health, a longer life expectancy at birth, a lower rate of child mortality, more public infrastructures, and the extension of a social welfare system that provides insurance against the major risks of life (illness, unemployment and retirement). Thus, it is possible that the share of the population that feels totally deprived (the bottom of the scale) and totally satisfied (the top of the scale) both shrink. This is consistent with what we observe in the data.

### Rescaling

Adaptation of needs *à la* Maslow is difficult to distinguish from another phenomenon: rescaling. Rescaling is a type of adaptation that does not concern latent satisfaction, i.e. the relationship between income and the actual level of happiness, but rather the relationship between latent happiness and self-declared happiness. The fact that happiness is measured on a bounded scale creates the strong suspicion that the meaning of the scale is context-dependent, i.e. people are changing the interpretation that they give to each step of the scale as the general context changes. Quoting Deaton (2008, p70): "*The 'best possible life for you' is a shifting standard that will move upwards with rising living standards*". The general

intuition is that, as the world of opportunities change, people also change their understanding of what the maximum possible happiness is (that associated with the tenth rung of the happiness ladder), and of what the worst possible situation is (the lower rung of the ladder), and more generally, of what the steps of the happiness ladder mean. But this does not necessarily mean that they are less happy with what they have (which would be classic adaptation). The notion of satisfaction treadmill, as opposed to hedonic treadmill, is capturing this idea (Frederick and Loewenstein, 1999, Frederick, 2007).

One possibility that would be consistent with our stylized facts is that people "rescale" more at the top of the ladder than at the bottom, because their world of opportunities expands more than that of less wealthy people. This would create a convergence movement whereby the self-declared happiness of the poor would rise whereas that of the rich would not.

In sum, even if it is difficult to disentangle adaptation from rescaling, and even if both are reminiscent of Maslow's theory of needs, these theories predict that adaptation is stronger at the top of the social scale, which is consistent with the decreasing spread of happiness over time.

## 7. Social equality and social expenditures

Finally, one possible element of the uncovered stylized facts is that an essential channel between income growth and happiness consists of the externalities of economic growth and modernization. In many Western countries, economic development has been accompanied by the creation and extension of a welfare system, which *stricto sensu* consists in social insurance against major life-time risks (health, unemployment and retirement insurance) and the provision of social transfers, but more generally brings an improvement in the realm of education, health, life expectancy, child mortality, etc. Accordingly, Table 1.A shows that the

share of social spending in national GDP reduces the variance in happiness across the countries of the *World Values Survey*.

But modern growth comes along with other types of benefits: material public goods such as infrastructure for transportation and communication, but also non-material public goods, such as reduced violence and crime, the benefit of living in a country where people are mode educated, greater freedom of choice in people's private life, political freedom, transparency and pluralism, better governance, etc. Some authors, e.g. Ott (2005), have shown the negative correlation of measures of the quality of institutions and governance (including democracy, freedom and government effectiveness), as well as gender empowerment measures, with happiness inequality. Veenhoven (2005b) attributes the fall in happiness inequality in EU countries, over the years 1973-2001 to the hypothesis that inequality in resources has been compensated by more equality in personal capabilities. Ovaska and Takashima (2010) regress happiness inequality over socioeconomic controls and income distribution as well as economic and political freedom taken from the *Fraser Institute* and *Freedom House*. Their aggregate level regressions show that the standard deviation in national happiness across countries of the WVS decreases with the different indices of political freedom.

All these political, economic and social changes can be seen as public goods, i.e. amenities accessible to all inhabitants of a country (although they may marginally benefit differently to different groups of the population). It is straightforward that the increased provision of public goods is bound to reduce the happiness spread across the population[16]. Of course, this extension of the positive externalities of modern growth cannot explain the constancy of average happiness over time. Hence, this hypothesis alone cannot explain our stylized facts; it has to be considered together with adaptation or rescaling.

[16] Technically, the extension of the sphere of public goods is equivalent to increasing every citizen's consumption by a similar positive amount. If happiness is a log function of consumption, this will naturally reduce the dispersion of happiness across the inhabitants of a country.

## Conclusions

In spite of the great U-turn (Veenhoven, 2005b) that saw income inequality rise in Western countries in the 1980s, happiness inequality is declining in modern societies. We provide international evidence of this evolution using information from the *World Values Survey* and country specific surveys of Australia, Great-Britain, Germany and the United-States. The decline in the spread of happiness comes as an addition to the Easterlin paradox, i.e. the stability of average happiness over long periods of growth. Taken together, these two stylized facts can hardly be explained by the hypothesis that individual happiness is a stable concave function of income. More behavioral hypotheses, such as income comparisons and simple adaptation over time are also insufficient to explain them. However, Maslow type adaptation and rescaling are consistent with these evolutions. The extension of public amenities brought about by modern growth is also likely to contribute to this homogeneity of happiness in modern nations.

This interpretation of the new "augmented" Easterlin paradox offers a less pessimistic vision of development. Raising the income of all will not raise the happiness of all, it will at least harmonize the happiness of all, provided that income inequality is not too high. Although data availability makes it easier to establish this new conjecture about the concentration of happiness in developed countries, this perspective is promising for developing countries, if they allow the benefits of modern growth and of a solid welfare system to accrue to their population.

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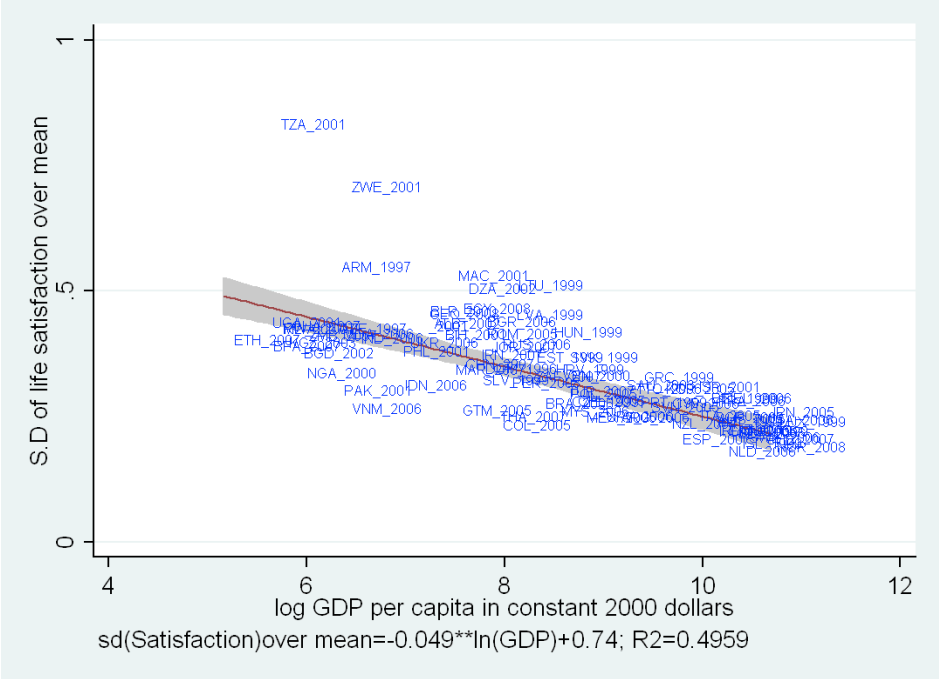
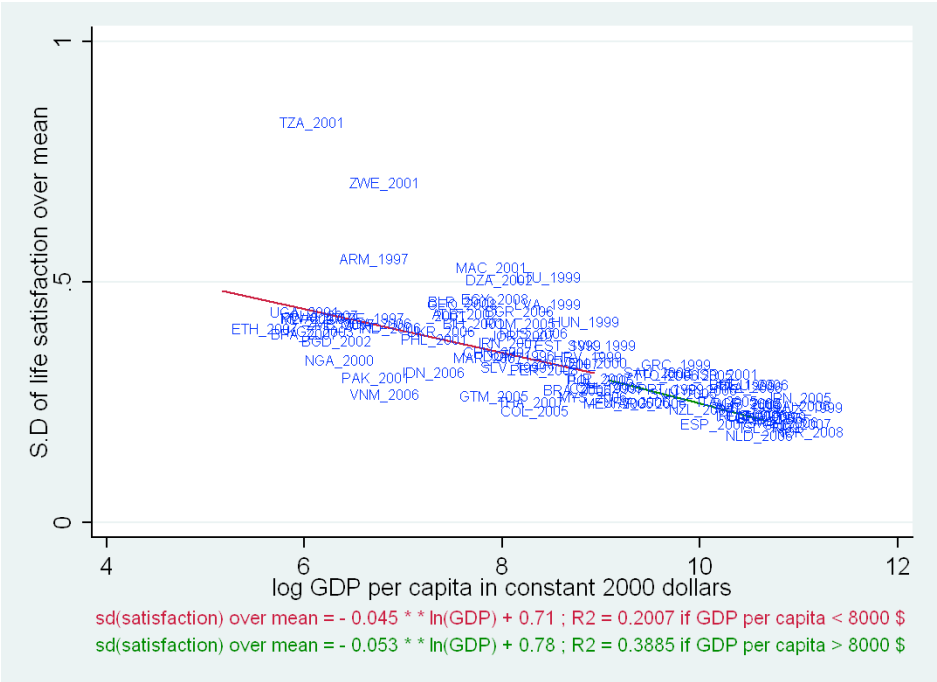
# Tables and Figures

## *Figure 1.A. Happiness inequality and GDP per capita, across countries of the WVS*



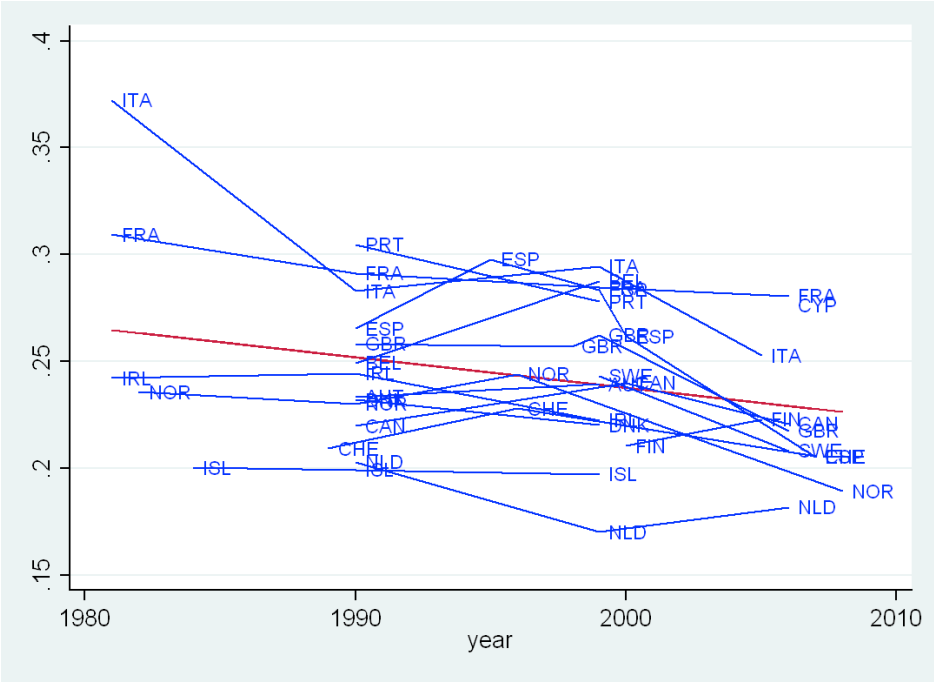

Source: WVS. Notes: GDP and average satisfaction are calculated for the last available year for each country (spanning from 2001 to 2008).

## *Figure 1.B. Happiness inequality and GDP per capita across rich and poor countries*



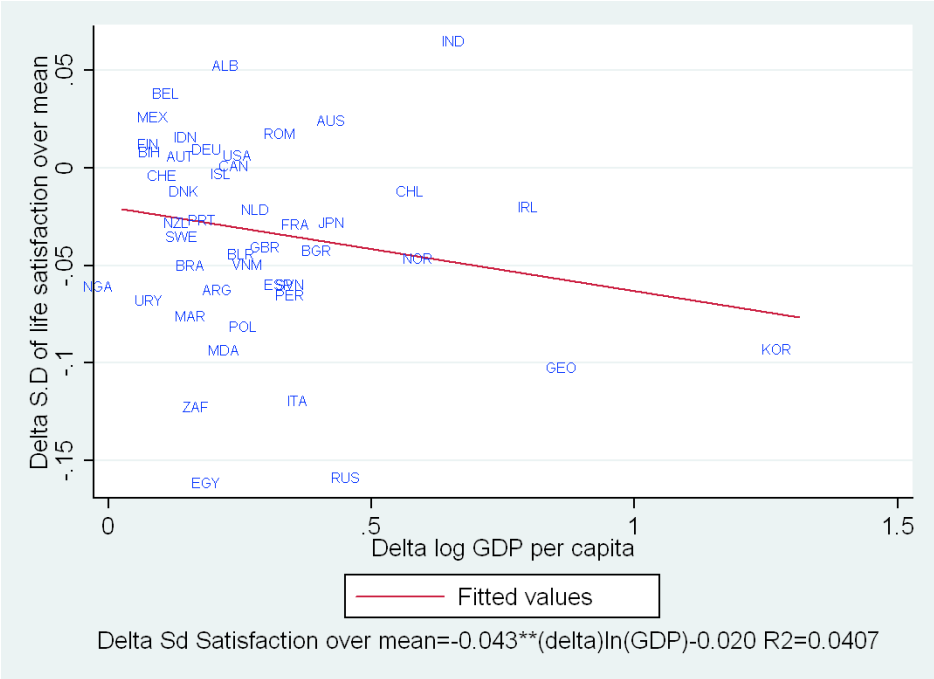

Source: WVS. Notes: GDP and average satisfaction are calculated for the last available year for each country (spanning from 2001 to 2008).

## *Figure 2.A Happiness inequality over time, Western countries (WVS)*




Trends in Life satisfaction Inequality, during periods of strictly increasing growth, periods of at least 5 years length.

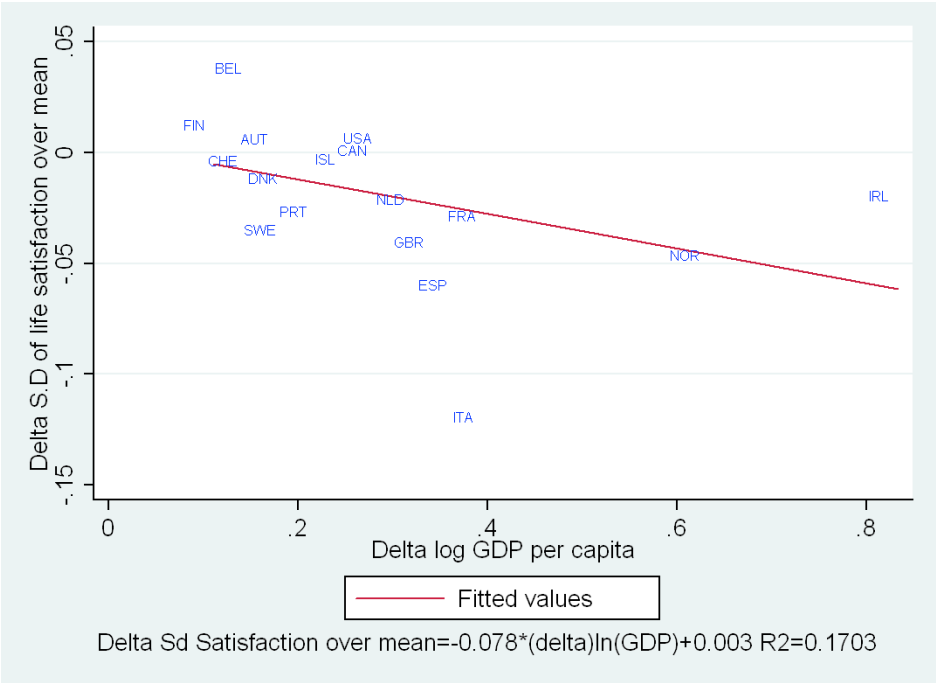
## *Figure 3.A Long run differences in happiness inequality and GDP per capita*




Periods of strictly increasing growth, of at least 5 years length.

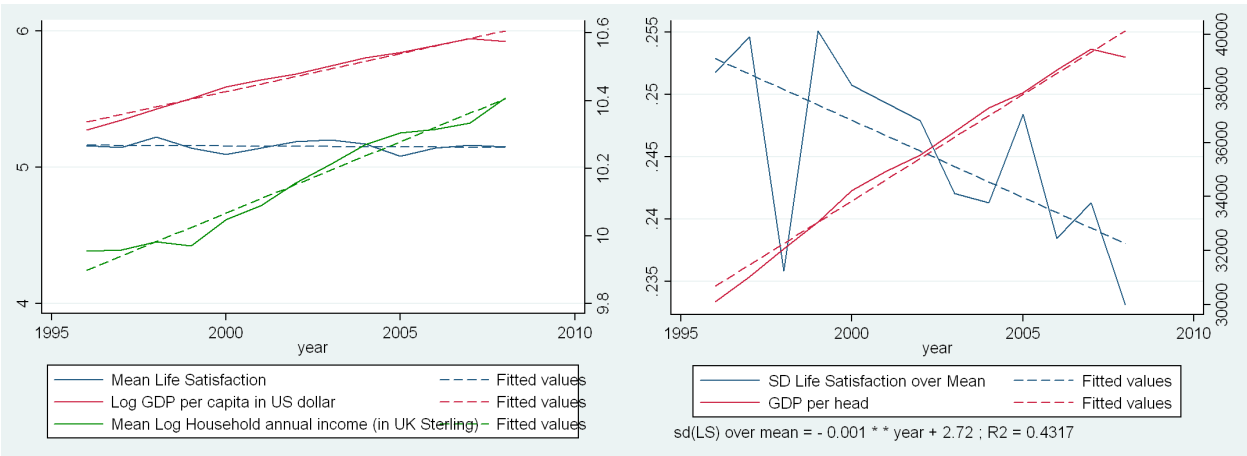
## *Figure 3.B Long run differences in happiness inequality and GDP per capita*

## *Western countries only*

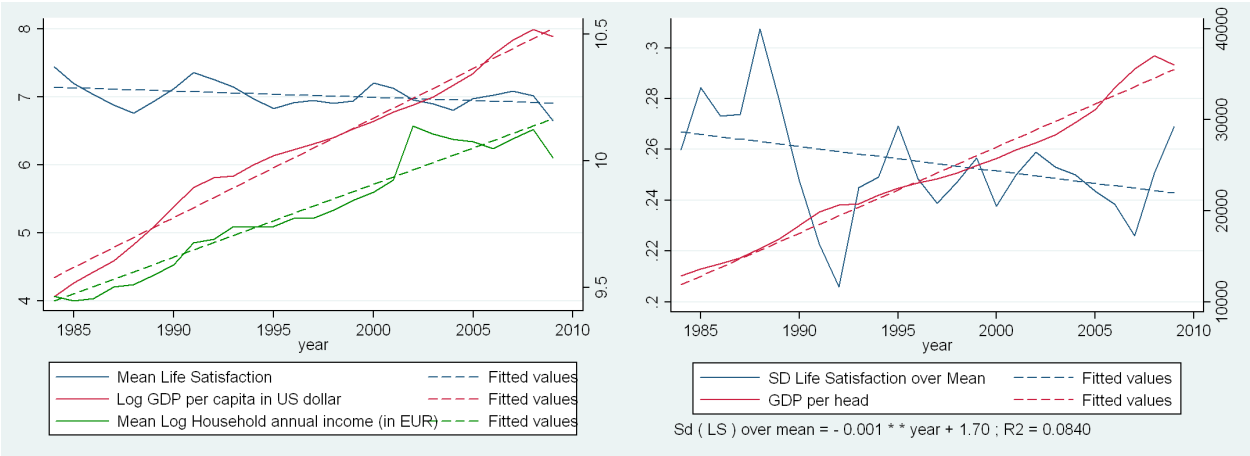



Periods of strictly increasing growth, of at least 5 years length.

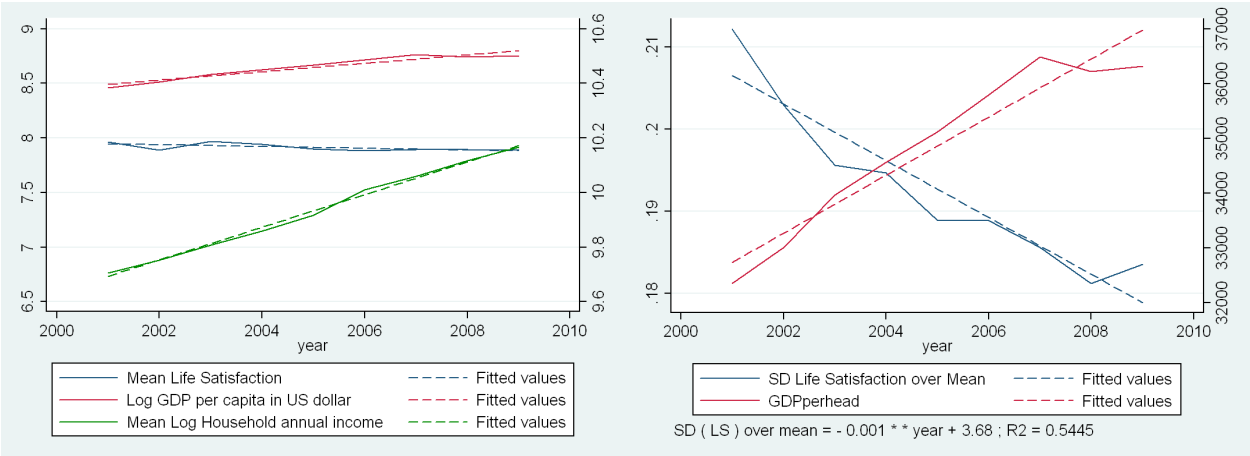
## *Figure 4.A Trends in income growth, average happiness and happiness inequality. BHPS*



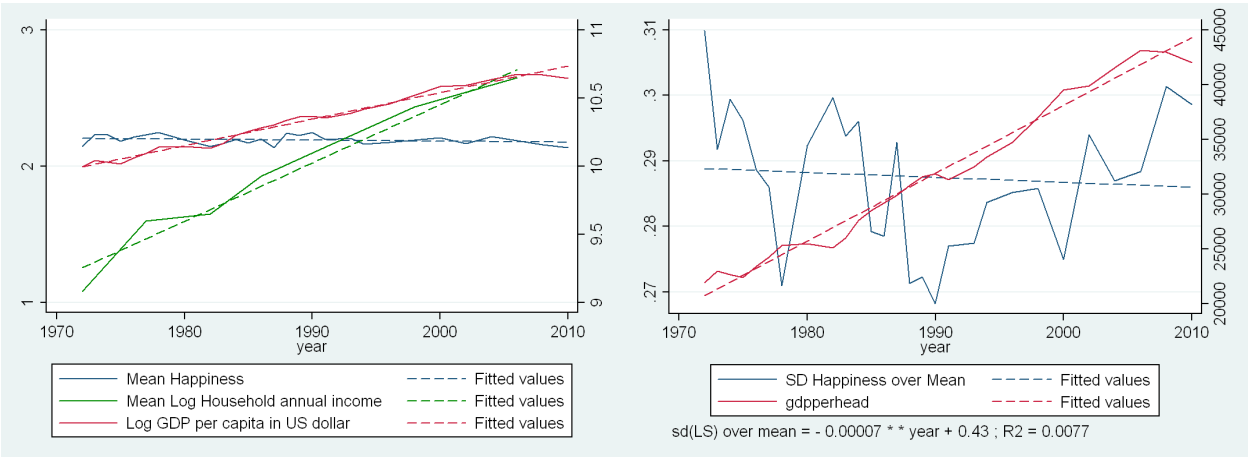
## *Figure 4.B Trends in income growth, average happiness and happiness inequality Germany*




## *Figure 4C Trends in income growth, average happiness and happiness inequality Australia*



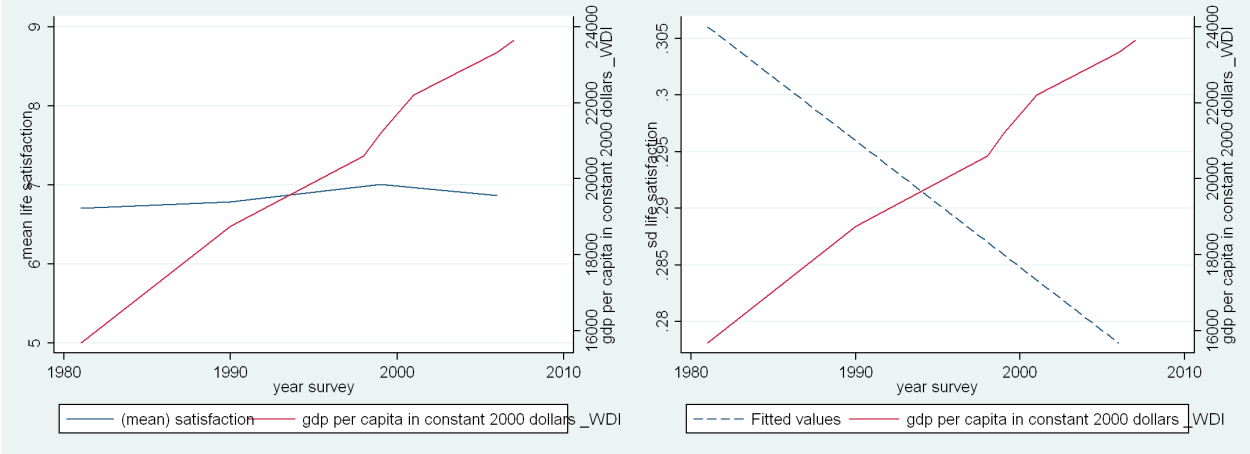

## *Figure 4.D Trends in income growth, average happiness and happiness inequality United States (GSS)*



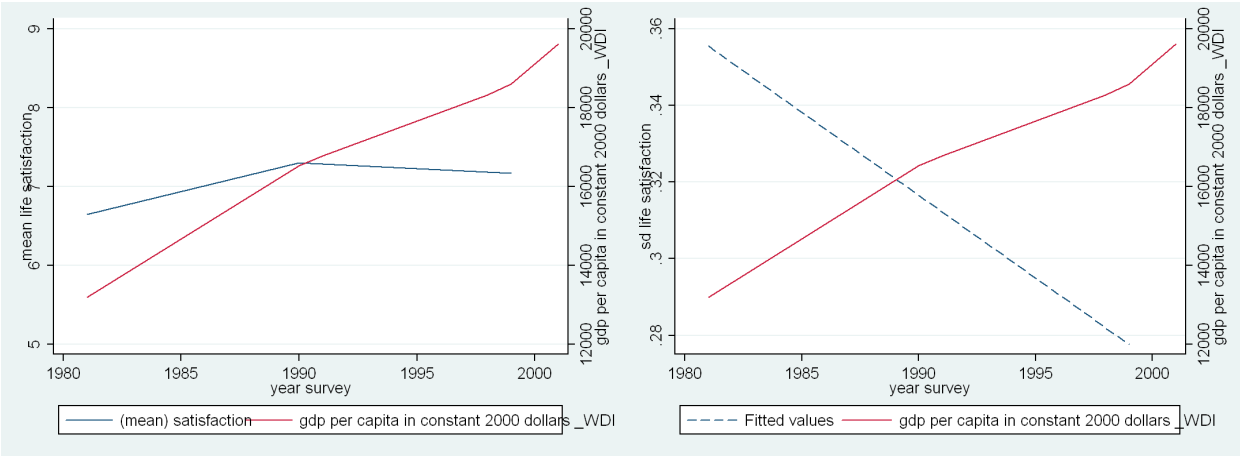
## *Figure 4E Trends in income growth, average happiness and happiness inequality in other countries of the WVS trends*

Only countries with periods of at least 10 years length with continuous positive growth and constant happiness

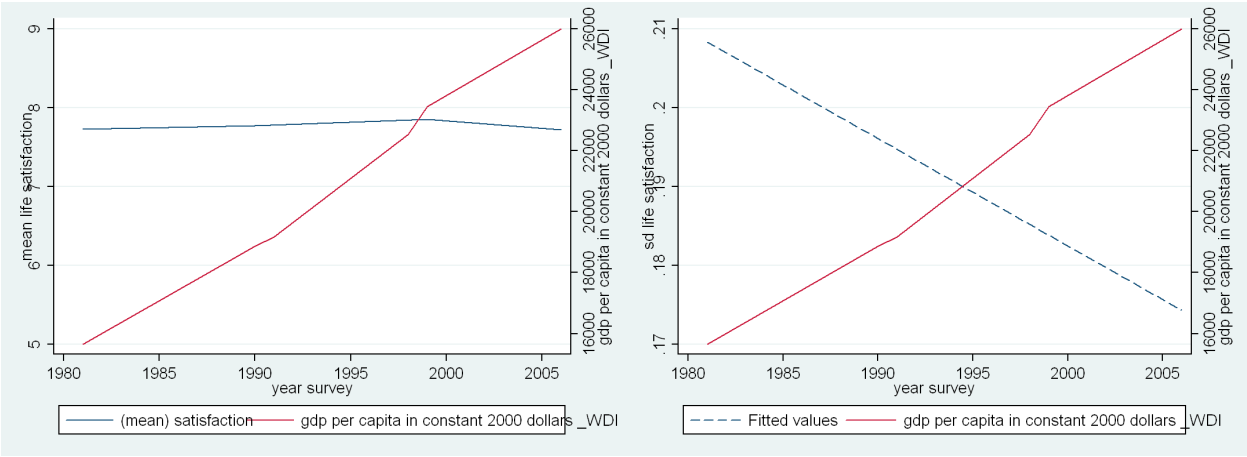
### France



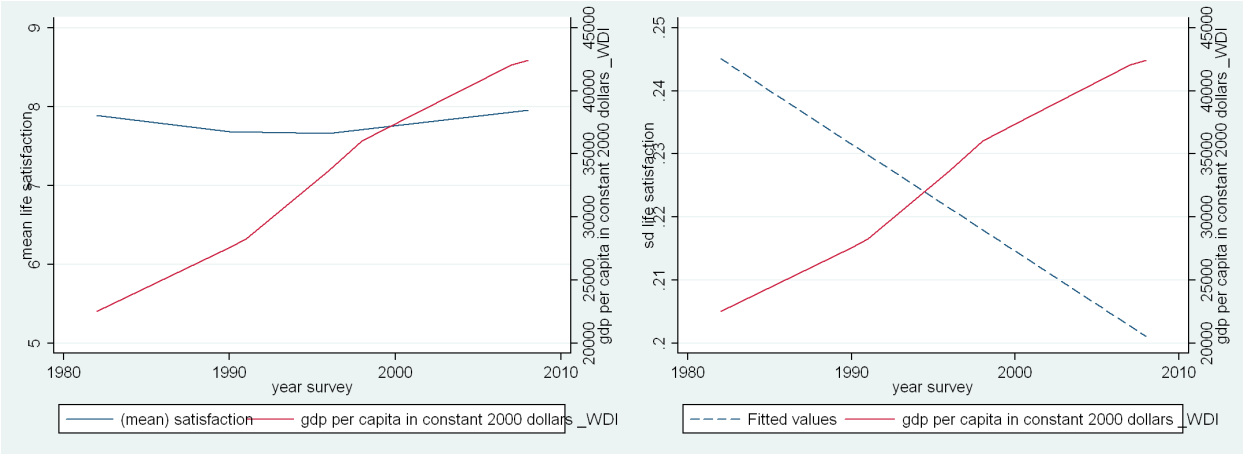

### Italy



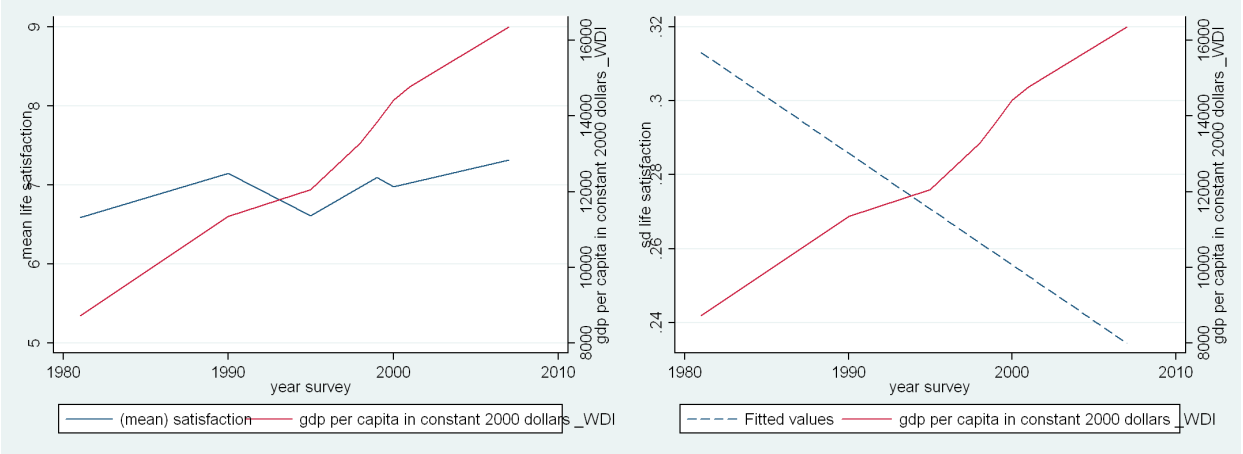

### The Netherlands



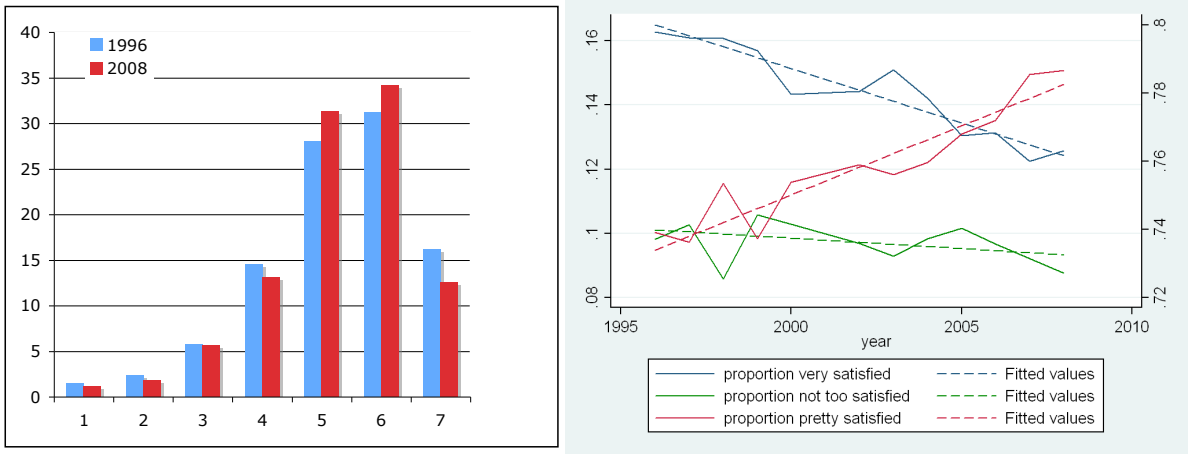
## Norway




## Spain

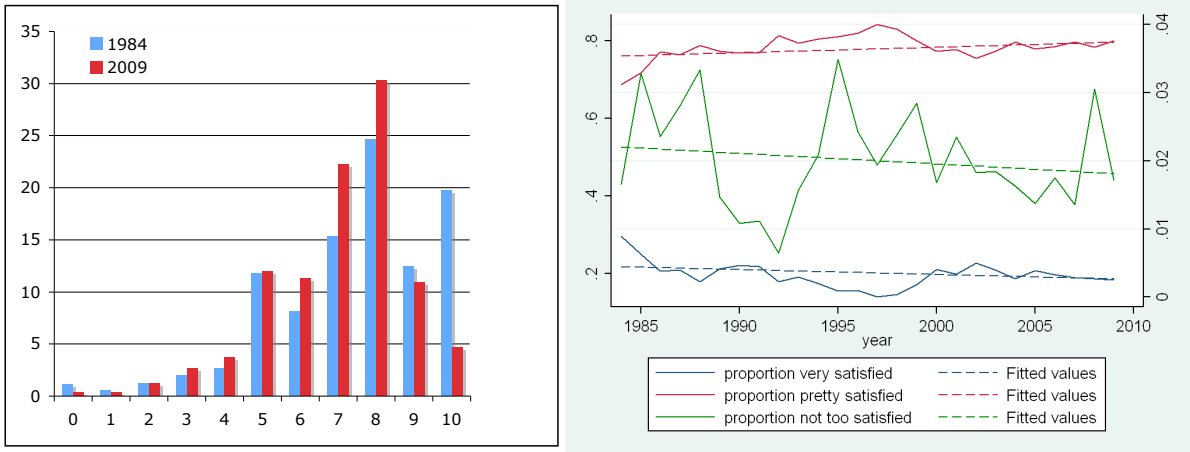


## *Figure 5.A The concentration of happiness distribution: Great-Britain, BHPS*



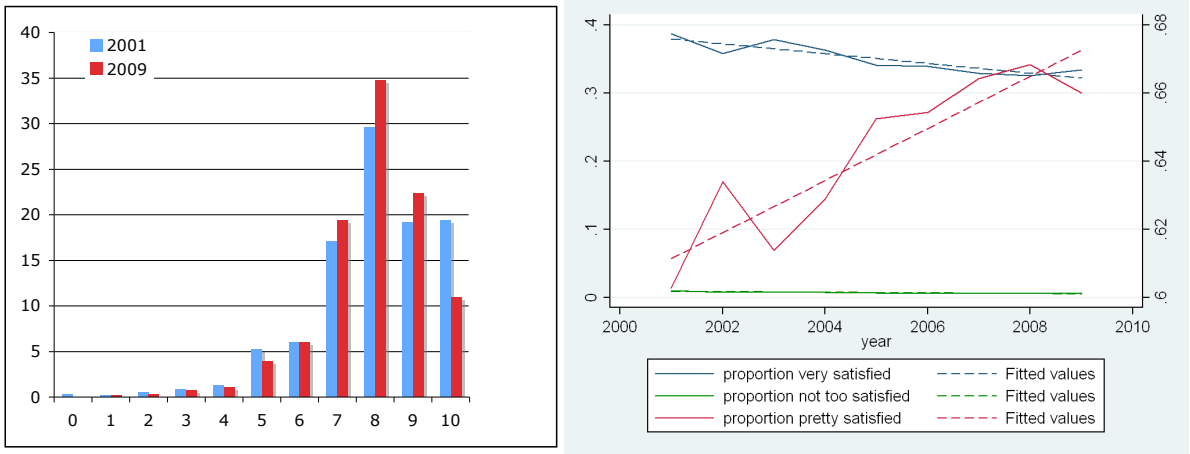

Note: not too satisfied = 1-3; Pretty satisfied= 4-6; Very satisfied= 7

## *Figure 5.B The concentration of happiness distribution: Germany, GSOEP*



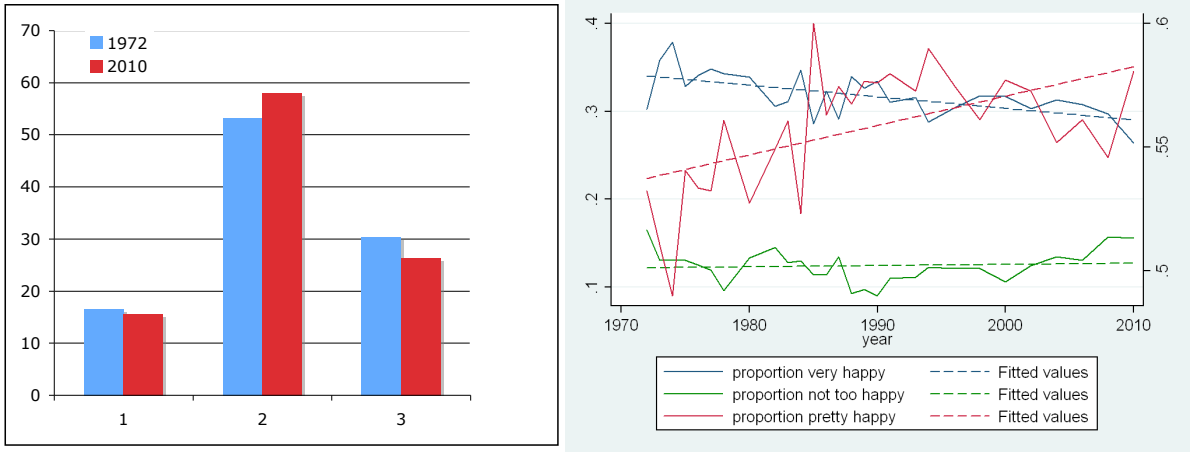

Not too satisfied = 0-2; Pretty satisfied = 3-8; Very satisfied = 9-10

## *Figure 5.C The concentration of happiness distribution: Australia (HILDA)*

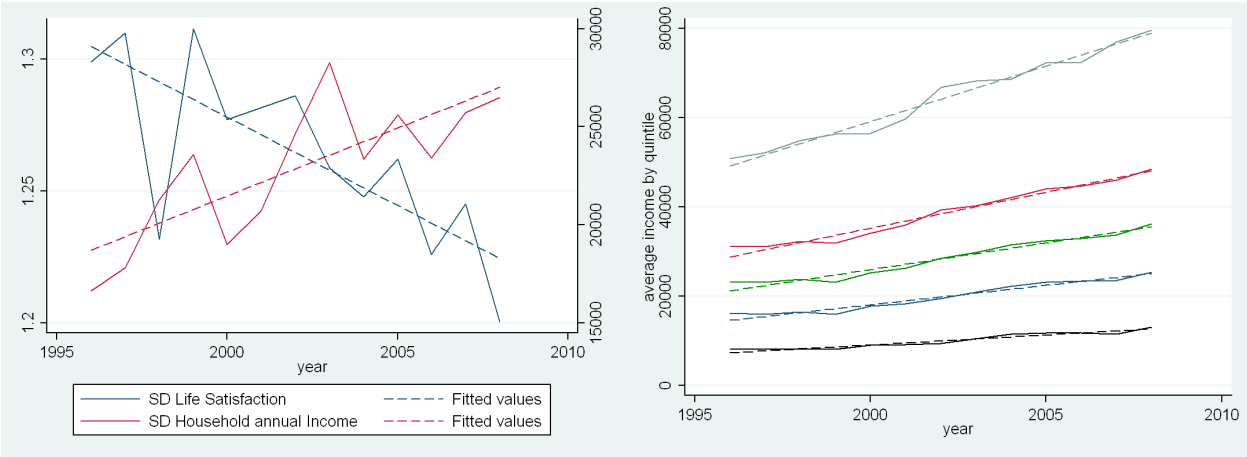



Not too satisfied = 0-2; Pretty satisfied = 3-8; Very satisfied = 9-10

## *Figure 5.D The concentration of happiness distribution: USA (GSS)*

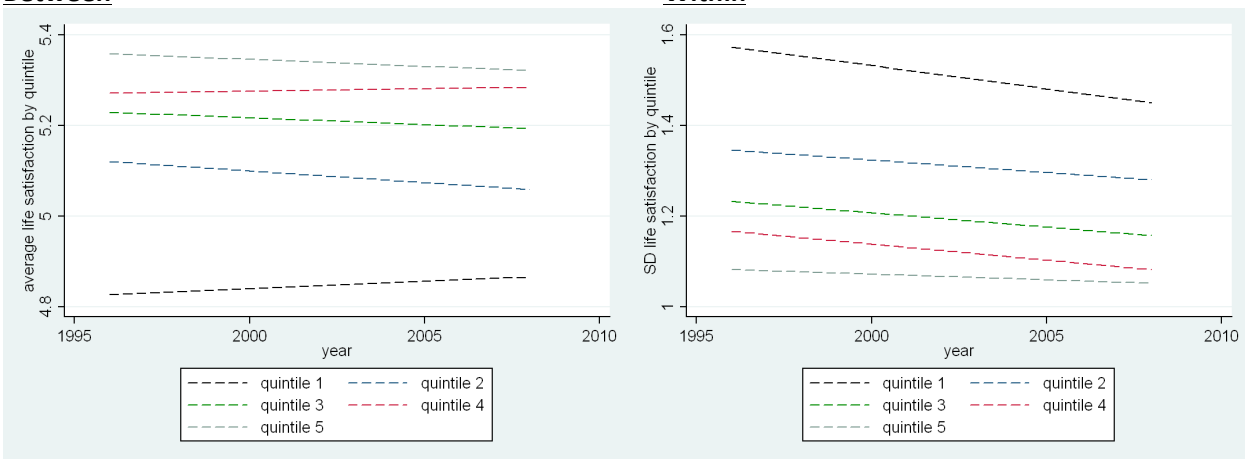



## *Figure 6.A Income inequality and happiness inequality: Great-Britain (BHPS)*

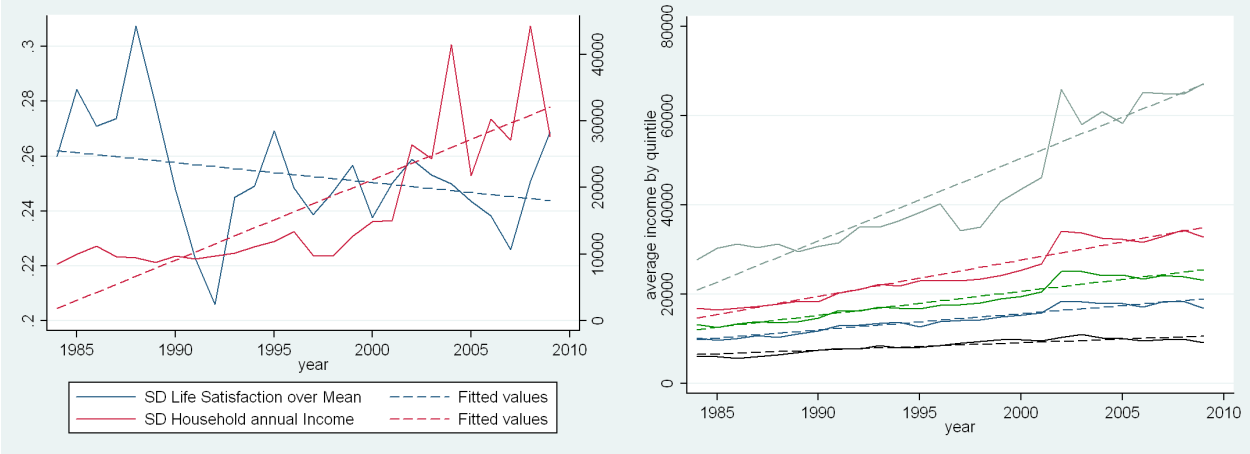



Legend: black (quintile 1), navy (quintile 2), green (quintile 3), cranberry (quintile 4), teal (quintile 5)

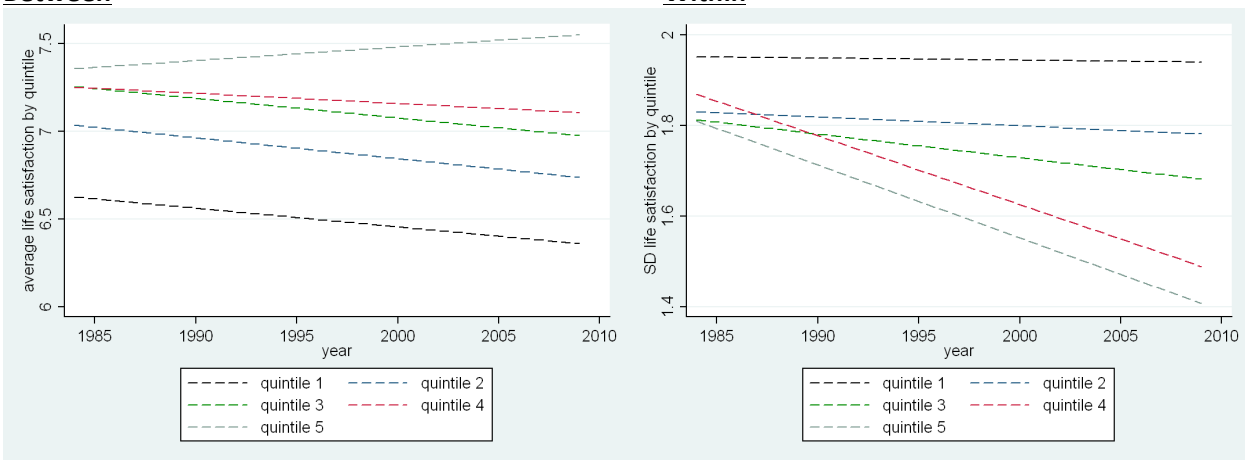
**Between** **Within**



## *Figure 6.B Income inequality and happiness inequality: Germany (GSOEP)*

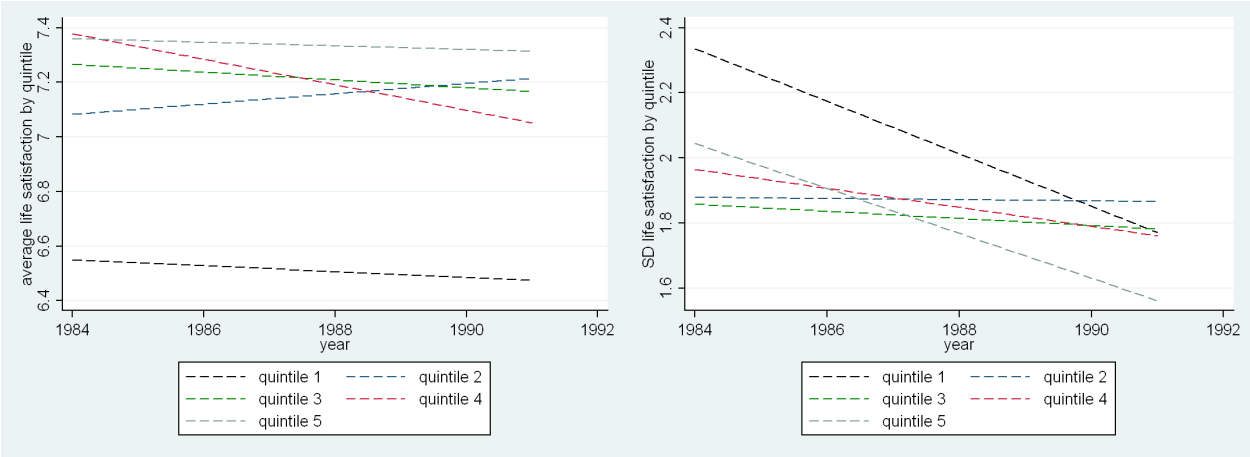



**Between** **Within**

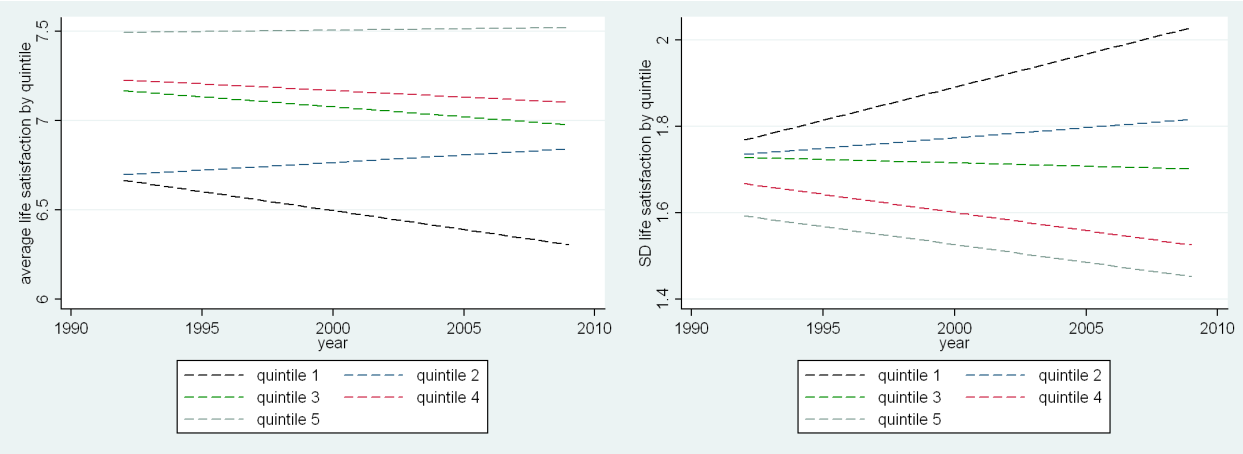



Legend: black (quintile 1), navy (quintile 2), green (quintile 3), cranberry (quintile 4), teal (quintile 5)

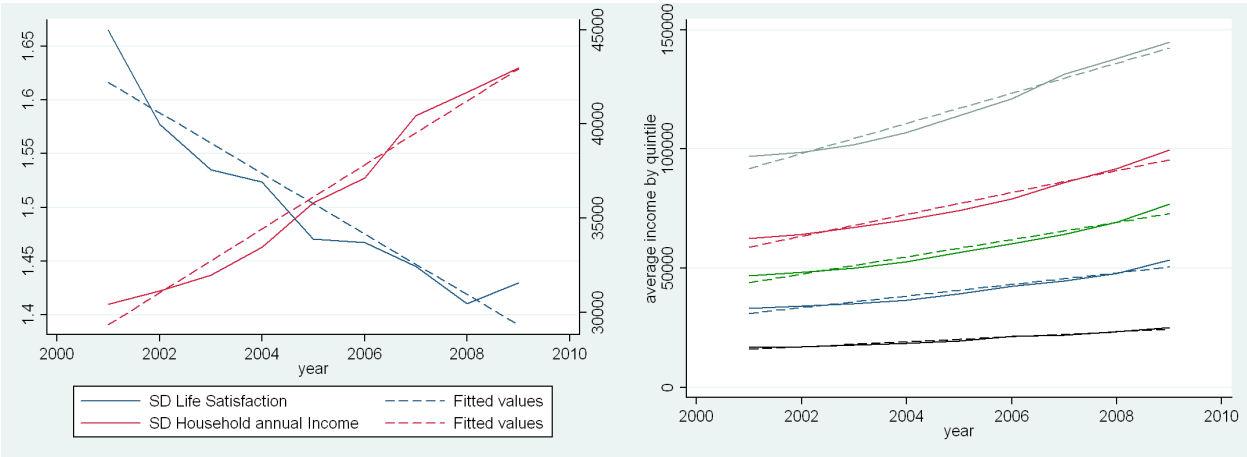
## GSOEP: 1984-1991



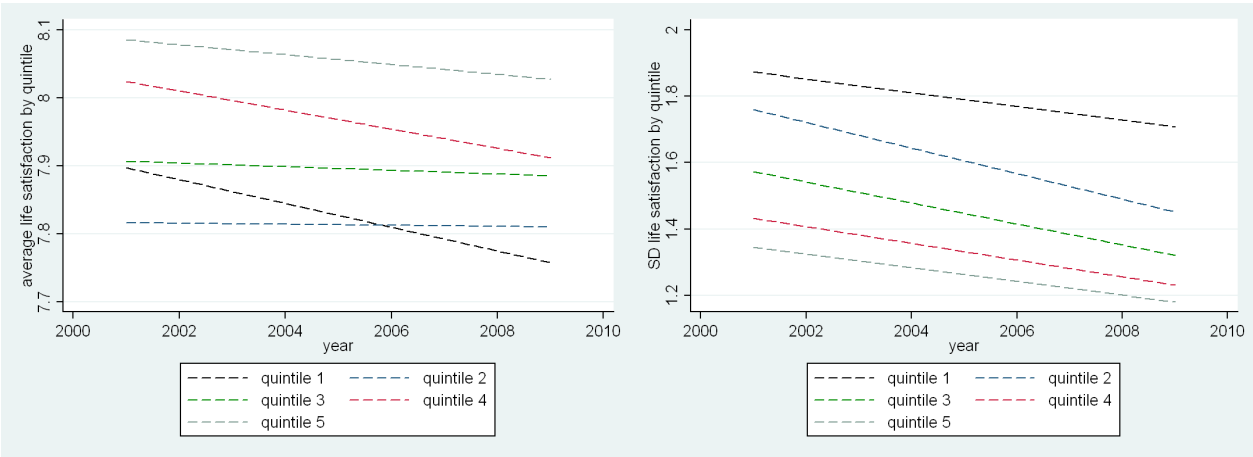

## GSOEP: 1992-2009



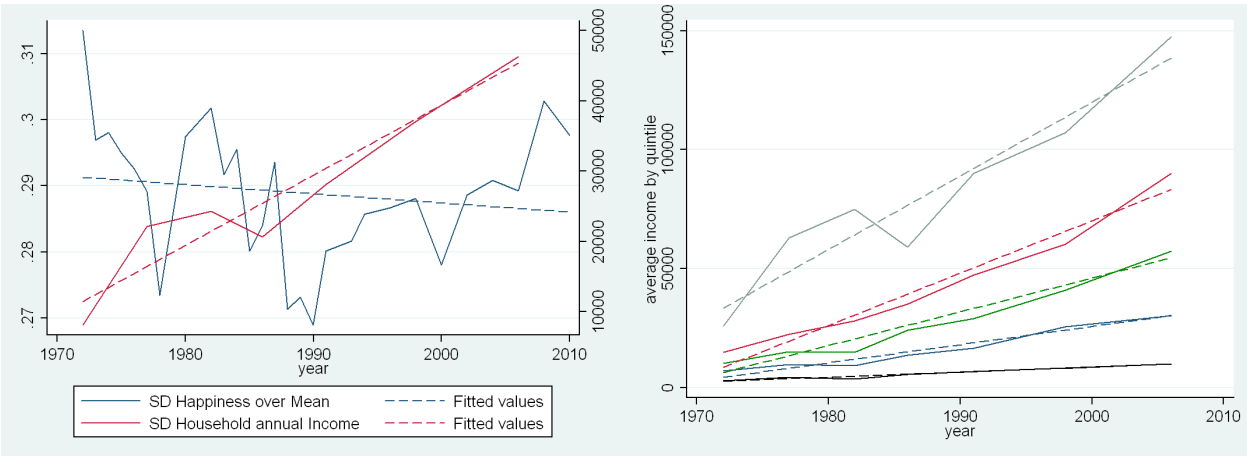
## *Figure 6.C Income inequality and happiness inequality: Australia (HILDA)*




**Between** **Within**

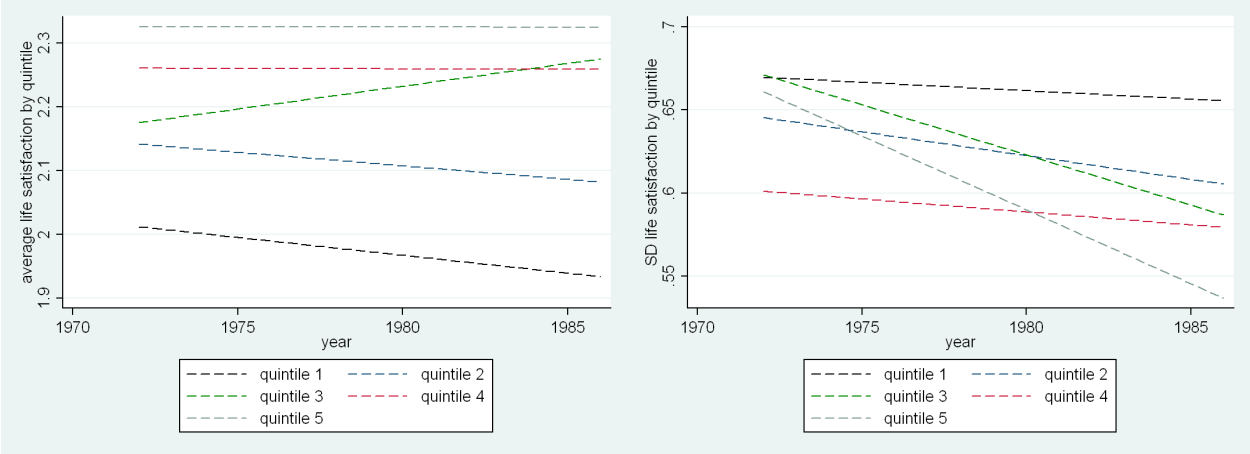



## *Figure 6.D Income inequality and happiness inequality: United-States (GSS)*

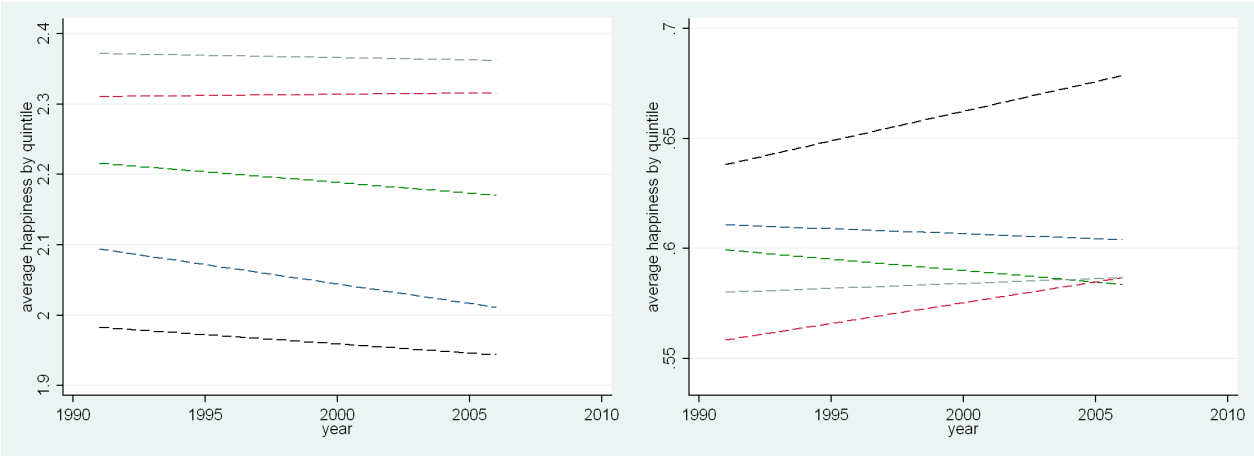



Legend: black (quintile 1), navy (quintile 2), green (quintile 3), cranberry (quintile 4), teal (quintile 5)

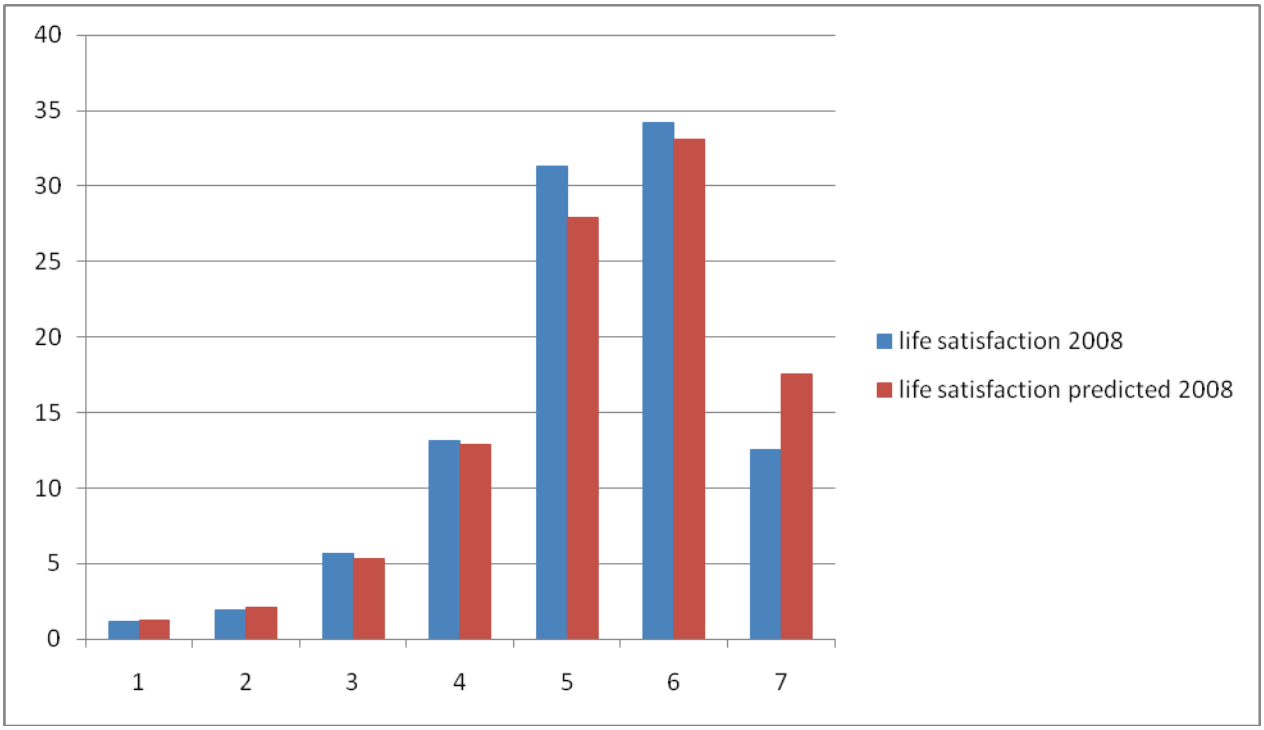
**Between** **Within**




**Between** **Within**



## *Figure 7.A Actual and simulated distribution of happiness: Great-Britain (BHPS)*

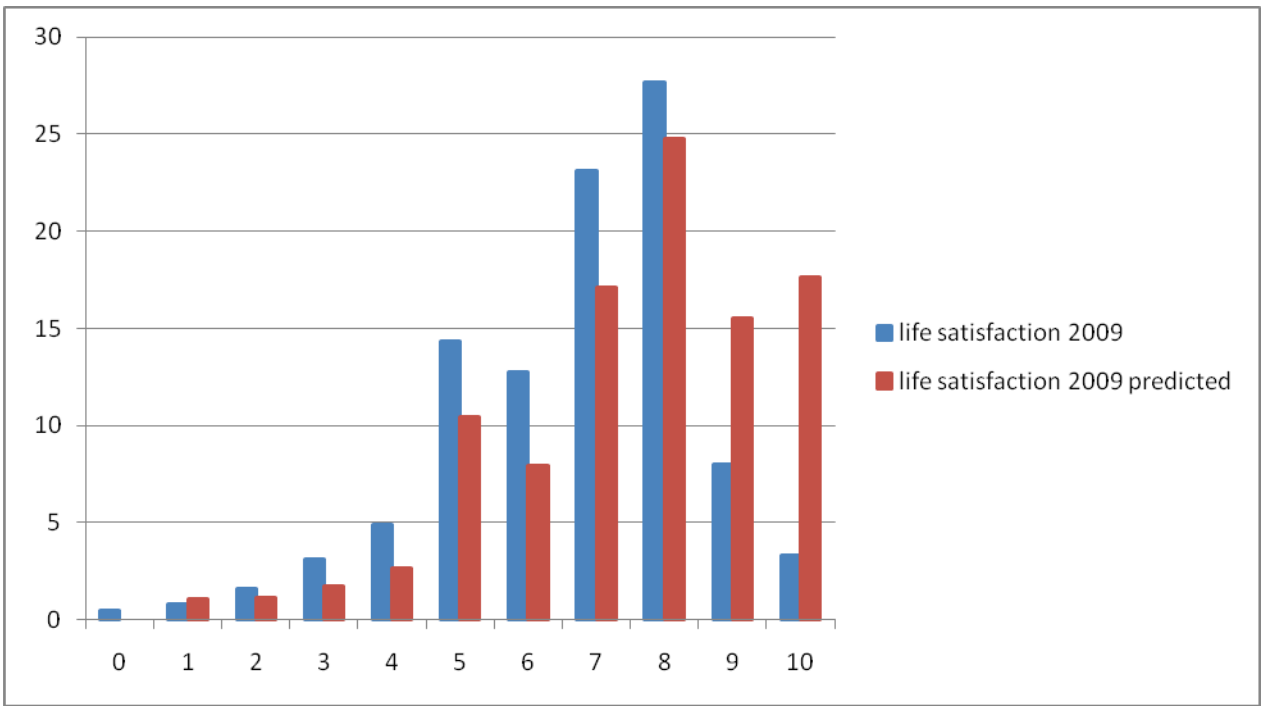



Estimation in 1996 of: Happiness= $a_0 + a_1$ age + $a_2$ age$^2$ + $a_3$ log income + $a_4$ women + $\varepsilon_i$

Prediction of happiness in 2008 with the demographic composition of 2008 and the happiness function of 1996

| | Life satisfaction 1996 | Life satisfaction 2008 predicted | Life satisfaction 2008 |
|---|---|---|---|
| **Average** | 5.23 | 5.47 | 5.24 |
| **Standard deviation** | 1.32 | 1.29 | 1.22 |

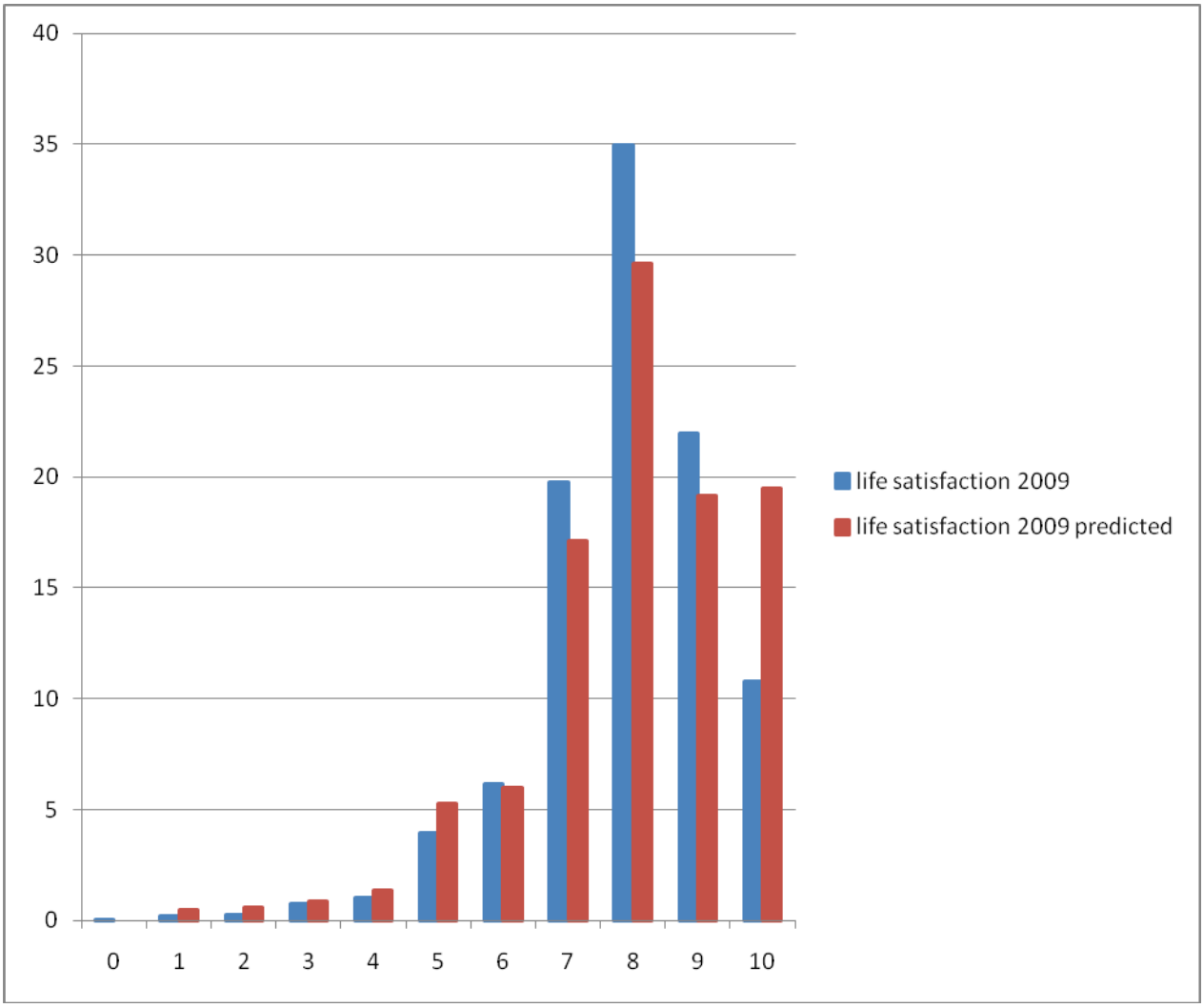
## *Figure 7.B Actual and simulated distribution of happiness: Germany (GSOEP)*




Prediction of happiness in 2009 with the happiness function estimated in 1984.

| | Life satisfaction 1984 | Life satisfaction 2009 predicted | Life satisfaction 2009 |
|---|---|---|---|
| **Average** | 7.58 | 7.50 | 6.68 |
| **Standard deviation** | 1.97 | 2.00 | 1.83 |

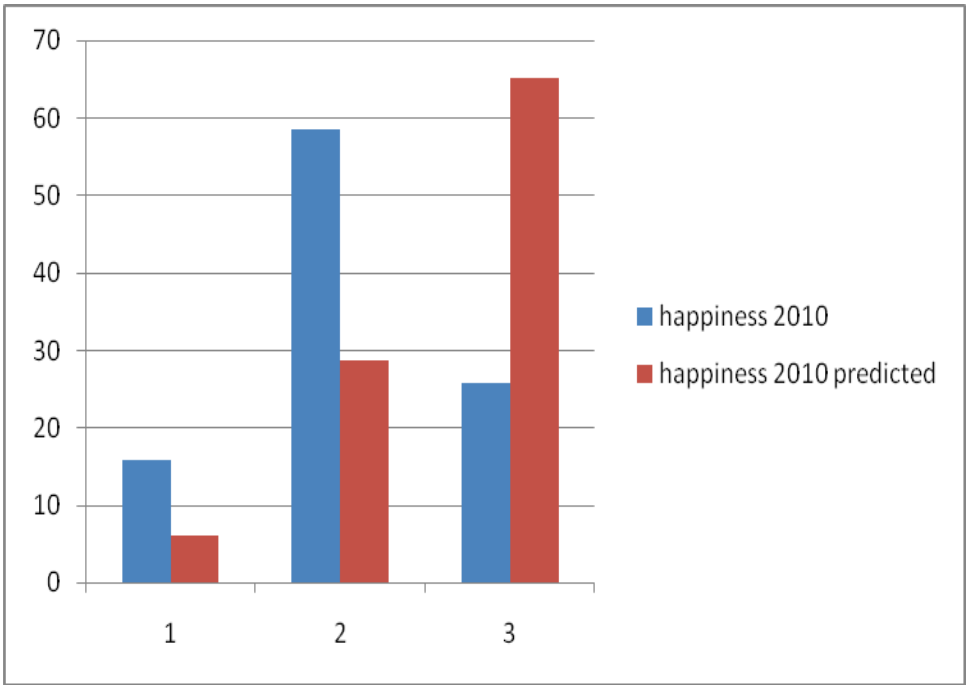
## *Figure 7.C Actual and simulated distribution of happiness: Australia (HILDA)*




Prediction of happiness in 2009 with the happiness function estimated in 2001.

| | Life satisfaction 2001 | Life satisfaction 2009 predicted | Life satisfaction 2009 |
|---|---|---|---|
| **Average** | 7.95 | 8.36 | 7.88 |
| **Standard deviation** | 1.66 | 1.69 | 1.42 |

## *Figure 7.D Actual and simulated distribution of happiness: USA (GSS)*




Prediction of happiness in 2010 with the happiness function estimated in 1972.

| | Happiness 1972 | Happiness 2010 predicted | Happiness 2010 |
|---|---|---|---|
| Average | 2.14 | 2.58 | 2.09 |
| Standard deviation | 0.66 | 0.60 | 0.63 |

## *Table 1.A RIF estimates of variance of life satisfaction across countries World Values Survey.*

| VARIABLES | (1)<br>rifvar | (2)<br>rifvar | (3)<br>rifvar | (4)<br>rifvar | (5)<br>rifvar | (6)<br>rifvar |
|---|---|---|---|---|---|---|
| **Ln GDP per capita** | **-0.528*** ** | **-0.552*** ** | **-0.687*** ** | **-0.199*** ** | **-0.0222** | **-0.267*** ** |
| | (0.0159) | (0.0162) | (0.0214) | (0.0290) | (0.0300) | (0.0243) |
| **Mean log Deviation** | | **7.739*** ** | **5.260*** ** | **6.530*** ** | **8.928*** ** | **9.360*** ** |
| | | (0.491) | (0.552) | (0.486) | (0.490) | (0.493) |
| Social Expenditure | | | 0.00876** | | | |
| | | | (0.00357) | | | |
| Rule of law | | | | -0.929*** | | |
| | | | | (0.0386) | | |
| Control of corruption | | | | | -1.114*** | |
| | | | | | (0.0371) | |
| Voice & accountability | | | | | | -1.104*** |
| | | | | | | (0.0383) |
| Observations | 126035 | 122681 | 86534 | 106628 | 106628 | 106628 |
| R-squared | 0.041 | 0.043 | 0.048 | 0.054 | 0.057 | 0.056 |

***Other controls: Year fixed effects, age categories, gender, number of children, education, employment status, marital status. Cluster(country). Weighted estimates.***

## *Table 1.B RIF estimates of variance of life satisfaction over time*

## *World Values Survey*

| | (1) | (2) | (3) |
|---|---|---|---|
| **Ln GDP per capita** | **-0.849*** ** | **-0.892*** ** | **-0.892*** ** |
| | (0.0756) | (0.0766) | (0.111) |
| **Mean Log Deviation in Income** | | **4.265*** ** | **2.685** ** |
| | | (0.924) | (1.165) |
| **Social expenditures** | | | **-0.0658*** ** |
| | | | (0.0160) |
| Women | -0.0758* | -0.0828* | -0.0843* |
| | (0.0431) | (0.0438) | (0.0506) |
| Age 25-55 | 0.265*** | 0.244*** | 0.269*** |
| | (0.0660) | (0.0670) | (0.0776) |
| Age 56-65 | 0.595*** | 0.584*** | 0.528*** |
| | (0.0926) | (0.0941) | (0.108) |
| One child | -0.139* | -0.154* | -0.0398 |
| | (0.0808) | (0.0819) | (0.0888) |
| Two children | -0.0825 | -0.0991 | -0.129 |
| | (0.0785) | (0.0796) | (0.0871) |
| Three children | -0.118 | -0.140* | 0.0736 |
| | (0.0799) | (0.0810) | (0.0900) |
| Married | 0.0322 | 0.0818 | 0.0576 |
| | (0.0776) | (0.0787) | (0.0850) |
| Divorced | 0.787*** | 0.823*** | 0.815*** |
| | (0.131) | (0.133) | (0.149) |
| Separated | 1.016*** | 1.058*** | 1.300*** |
| | (0.163) | (0.166) | (0.181) |
| Widowed | 1.089*** | 1.157*** | 0.959*** |
| | (0.135) | (0.137) | (0.157) |
| Out of labor force | 0.223*** | 0.220*** | 0.293*** |
| | (0.0587) | (0.0597) | (0.0687) |
| Student | 0.0301 | 0.0508 | 0.344*** |
| | (0.0877) | (0.0889) | (0.0990) |
| Unemployed | 1.516*** | 1.520*** | 1.555*** |
| | (0.0718) | (0.0732) | (0.0814) |
| Middle education | -0.757*** | -0.771*** | -0.974*** |
| | (0.0496) | (0.0505) | (0.0576) |
| High education | -1.124*** | -1.126*** | -1.465*** |
| | (0.0597) | (0.0607) | (0.0702) |
| | (0.459) | (45,538) | (0.397) |
| Constant | 13.19*** | 13.85 | 13.22*** |
| | (0.776) | (45,538) | (0.799) |
| Observations | 126035 | 122681 | 86534 |
| R-squared | 0.073 | 0.073 | 0.064 |

***Other controls: Country fixed effects. Cluster(country). Weighted estimates.***

# Appendix

## *A1. Descriptive statistics*

### World Values Survey

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| Life satisfaction | 195558 | 6.52 | 2.48 | 1 | 10 |
| SD Life satisfaction | 195558 | 2.21 | 0.35 | 1.41 | 3.35 |
| SD Life satisfaction/mean | 195558 | 0.36 | 0.10 | 0.18 | 0.71 |
| Log Income | 174889 | 1.35 | 0.63 | 0 | 2.30 |
| Women | 195484 | 0.52 | 0.50 | 0 | 1 |
| Age 18-24 | 195558 | 0.17 | 0.38 | 0 | 1 |
| Age 25-55 | 195558 | 0.72 | 0.45 | 0 | 1 |
| Age 56-65 | 195558 | 0.11 | 0.32 | 0 | 1 |
| Married | 192341 | 0.67 | 0.47 | 0 | 1 |
| Divorced | 192341 | 0.03 | 0.18 | 0 | 1 |
| Separated | 192341 | 0.02 | 0.14 | 0 | 1 |
| Single | 192341 | 0.24 | 0.43 | 0 | 1 |
| Widowed | 192341 | 0.03 | 0.18 | 0 | 1 |
| Out of labor force | 188032 | 0.22 | 0.41 | 0 | 1 |
| Student | 188032 | 0.06 | 0.25 | 0 | 1 |
| Unemployed | 188032 | 0.10 | 0.30 | 0 | 1 |
| Employed | 188032 | 0.48 | 0.50 | 0 | 1 |
| Low education | 180219 | 0.34 | 0.47 | 0 | 1 |
| Middle education | 180219 | 0.43 | 0.50 | 0 | 1 |
| High education | 180219 | 0.22 | 0.42 | 0 | 1 |
| GDP per capita | 193225 | 8933 | 13240 | 234 | 93367 |
| Mean Log Deviation | 191218 | 0.14 | 0.05 | 0.04 | 0.32 |
| Rule of law | 120797 | 0.06 | 1.02 | -1.86 | 1.98 |
| Control of corruption | 120797 | 0.12 | 1.09 | -1.56 | 2.44 |
| Voice & accountability | 120797 | 0.09 | 0.93 | -1.70 | 1.70 |
| Year | 195558 | 2000 | 6 | 1981 | 2008 |

## BHPS: 1996-2008

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| Life satisfaction | 119234 | 5.15 | 1.26 | 1 | 7 |
| SD Life satisfaction | 119234 | 1.26 | 0.03 | 1 | 1 |
| SD Life satisfaction / mean | 119234 | 0.25 | 0.01 | 0 | 0 |
| GDP per capita | 119234 | 35608 | 2948 | 30110 | 39462 |
| sd(income) | 119234 | 23242 | 3323 | 16642 | 28259 |
| Women | 119234 | 0.54 | 0.50 | 0 | 1 |
| Age 18-24 | 119234 | 0.12 | 0.33 | 0 | 1 |
| Age 25-55 | 119234 | 0.68 | 0.46 | 0 | 1 |
| Age 56-65 | 119234 | 0.17 | 0.38 | 0 | 1 |
| Low educ | 119234 | 0.00 | 0.04 | 0 | 1 |
| Middle educ | 119234 | 0.02 | 0.15 | 0 | 1 |
| High educ | 119234 | 0.02 | 0.13 | 0 | 1 |
| Out of labor force | 119234 | 0.21 | 0.41 | 0 | 1 |
| Student | 119234 | 0.04 | 0.19 | 0 | 1 |
| Unemployed | 119234 | 0.04 | 0.20 | 0 | 1 |
| Employed | 119234 | 0.62 | 0.48 | 0 | 1 |
| One child | 119234 | 0.18 | 0.39 | 0 | 1 |
| Two children | 119234 | 0.13 | 0.34 | 0 | 1 |
| Three children | 119234 | 0.06 | 0.23 | 0 | 1 |
| Married | 119234 | 0.69 | 0.46 | 0 | 1 |
| Single | 119234 | 0.21 | 0.41 | 0 | 1 |
| Divorced | 119234 | 0.06 | 0.24 | 0 | 1 |
| Separated | 119234 | 0.02 | 0.14 | 0 | 1 |
| Widowed | 119234 | 0.02 | 0.14 | 0 | 1 |

## GSOEP : 1984-2009

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| Life satisfaction | 15605 | 7.15 | 1.77 | 0 | 10 |
| SD Life satisfaction | 15605 | 1.76 | 0.12 | 1.49 | 2.08 |
| SD Life satisfaction / mean | 15605 | 0.25 | 0.02 | 0.21 | 0.31 |
| Gdp per head | 15605 | 25808 | 7134 | 12873 | 37060 |
| Sd income | 15605 | 21640 | 10706 | 8635 | 41364 |
| women | 15605 | 0.34 | 0.47 | 0 | 1 |
| Age 18-24 | 15605 | 0.02 | 0.14 | 0 | 1 |
| Age 25-55 | 15605 | 0.81 | 0.39 | 0 | 1 |
| Age 56-65 | 15605 | 0.17 | 0.37 | 0 | 1 |
| Low education | 15605 | 0.33 | 0.47 | 0 | 1 |
| Middle education | 15605 | 0.29 | 0.45 | 0 | 1 |
| High education | 15605 | 0.28 | 0.45 | 0 | 1 |
| Out of labor force | 15605 | 0.02 | 0.13 | 0 | 1 |
| Student | 15605 | 0.00 | 0.04 | 0 | 1 |
| Unemployed | 15605 | 0.02 | 0.14 | 0 | 1 |
| Employed | 15605 | 0.07 | 0.26 | 0 | 1 |
| One child | 15605 | 0.20 | 0.40 | 0 | 1 |
| Two children | 15605 | 0.18 | 0.38 | 0 | 1 |
| Three children | 15605 | 0.07 | 0.26 | 0 | 1 |
| Married | 15591 | 0.71 | 0.45 | 0 | 1 |
| Single | 15591 | 0.16 | 0.37 | 0 | 1 |
| Divorced | 15591 | 0.08 | 0.28 | 0 | 1 |
| Separated | 15591 | 0.03 | 0.17 | 0 | 1 |
| Widowed | 15591 | 0.02 | 0.13 | 0 | 1 |

## HILDA: 2001-2009

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| Life satisfaction | 93275 | 7,80 | 1,51 | 0 | 10 |
| SD Life satisfaction | 93275 | 1,50 | 0,08 | 1,41 | 1,67 |
| SD Life satisfaction over mean | 93275 | 0,19 | 0,01 | 0,18 | 0,21 |
| GDP per capita | 93275 | 34833 | 1441 | 32350 | 36482 |
| Sd income | 93275 | 36063 | 4493 | 30446 | 42993 |
| women | 93275 | 0,52 | 0,50 | 0 | 1 |
| Age 1824 | 93275 | 0,15 | 0,36 | 0 | 1 |
| Age 2555 | 93275 | 0,69 | 0,46 | 0 | 1 |
| Age 5665 | 93275 | 0,16 | 0,36 | 0 | 1 |
| Low educ | 92229 | 0,23 | 0,42 | 0 | 1 |
| Middle educ | 92229 | 0,74 | 0,44 | 0 | 1 |
| High educ | 92229 | 0,03 | 0,17 | 0 | 1 |
| Out of labor force | 93238 | 0,16 | 0,37 | 0 | 1 |
| Student | 93238 | 0,02 | 0,15 | 0 | 1 |
| Unemployed | 93238 | 0,06 | 0,24 | 0 | 1 |
| Employed | 93238 | 0,75 | 0,43 | 0 | 1 |
| One child | 93272 | 0,12 | 0,33 | 0 | 1 |
| Two children | 93272 | 0,27 | 0,44 | 0 | 1 |
| Three child~n | 93272 | 0,26 | 0,44 | 0 | 1 |
| Married | 93252 | 0,66 | 0,47 | 0 | 1 |
| Single | 93252 | 0,23 | 0,42 | 0 | 1 |
| Divorced | 93252 | 0,06 | 0,24 | 0 | 1 |
| Separated | 93252 | 0,03 | 0,18 | 0 | 1 |
| Widowed | 93252 | 0,01 | 0,12 | 0 | 1 |

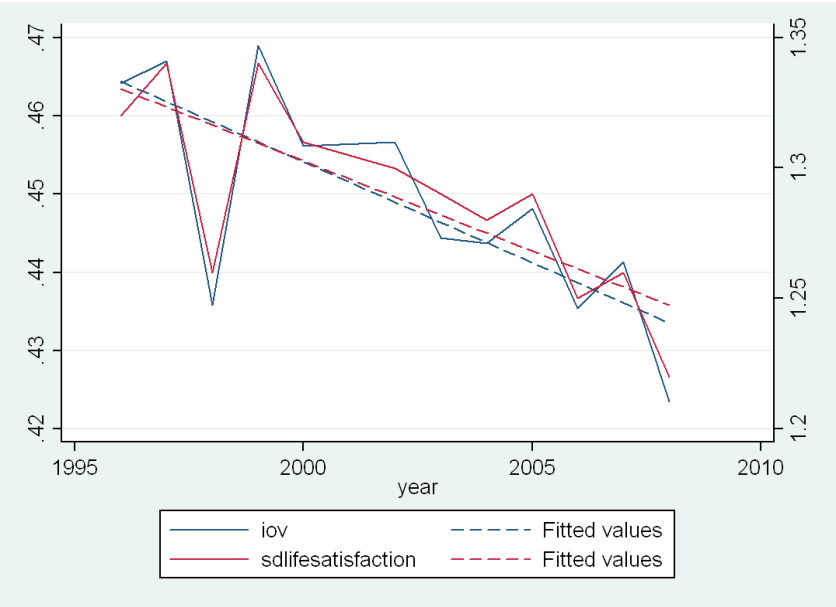
## GSS : 1972-2010

| Variable | Obs | Mean | Std, Dev, | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| Happy | 41383 | 2,18 | 0,63 | 1 | 3 |
| SD happienss | 41383 | 0,63 | 0,02 | 0,60 | 0,67 |
| SD Happiness / mean | 41383 | 0,29 | 0,01 | 0,27 | 0,31 |
| GDP per capita | 41383 | 31953 | 6882 | 21912 | 43131 |
| sd income | 11320 | 30014 | 12294 | 7942 | 47029 |
| Women | 41383 | 1,55 | 0,50 | 1 | 2 |
| Age 18-24 | 41383 | 0,13 | 0,33 | 0 | 1 |
| Age 25-55 | 41383 | 0,73 | 0,45 | 0 | 1 |
| Age 56-65 | 41383 | 0,14 | 0,35 | 0 | 1 |
| Low education | 41306 | 0,10 | 0,29 | 0 | 1 |
| Middle education | 41306 | 0,63 | 0,48 | 0 | 1 |
| High education | 41306 | 0,28 | 0,45 | 0 | 1 |
| Out of labor force | 41376 | 0,19 | 0,39 | 0 | 1 |
| Student | 41376 | 0,04 | 0,19 | 0 | 1 |
| Unemployed | 41376 | 0,06 | 0,24 | 0 | 1 |
| Employed | 41376 | 0,69 | 0,46 | 0 | 1 |
| One child | 41281 | 0,16 | 0,37 | 0 | 1 |
| Two children | 41281 | 0,25 | 0,43 | 0 | 1 |
| Three children | 41281 | 0,29 | 0,46 | 0 | 1 |
| Married | 41377 | 0,57 | 0,50 | 0 | 1 |
| Single | 41377 | 0,23 | 0,42 | 0 | 1 |
| Divorced | 41377 | 0,13 | 0,33 | 0 | 1 |
| Separated | 41377 | 0,04 | 0,19 | 0 | 1 |
| Widowed | 41377 | 0,03 | 0,18 | 0 | 1 |

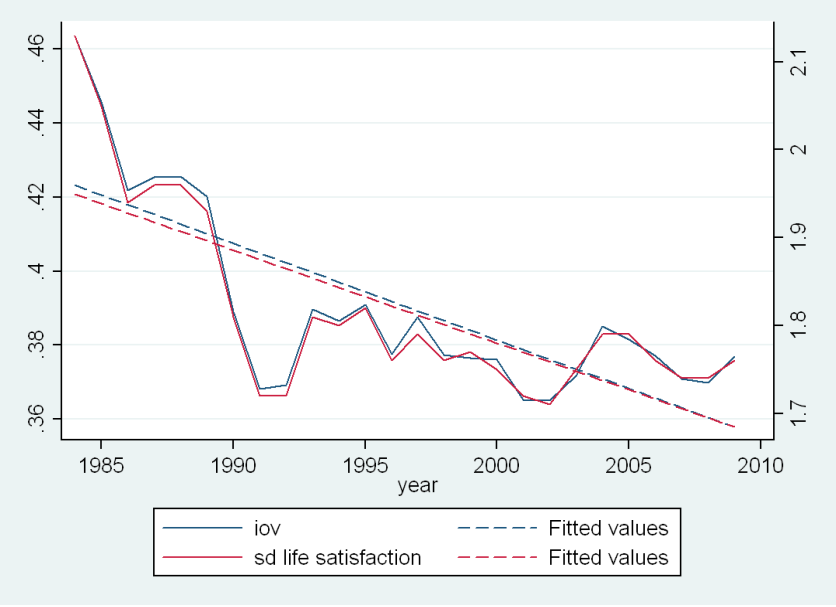
## *A2: Comparison IOV/ standard deviation*

Index of ordinal variation has (IOV) for ordered categorical data was (Berry & Mielke. 1992). The IOV measure takes value 0 when all values fall into one category and value 1 when extreme polarization prevails.

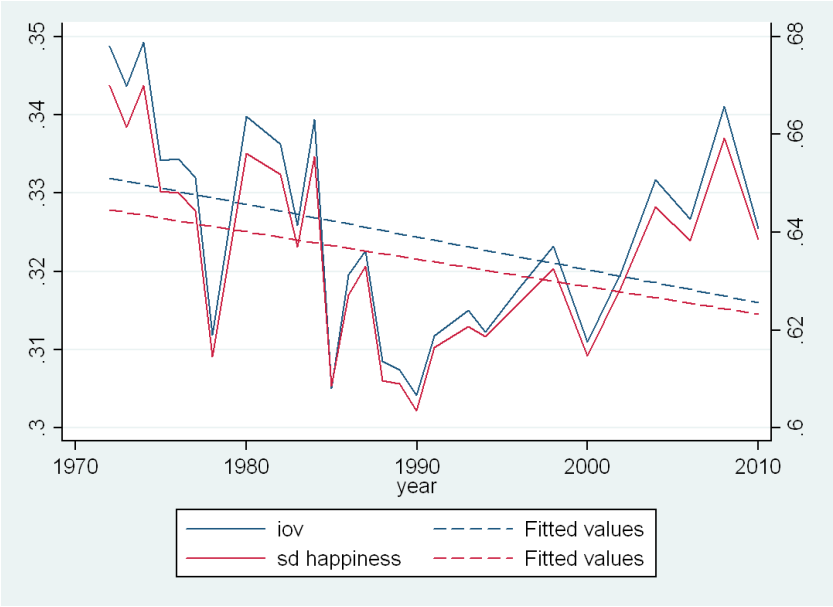
### BHPS




### GSOEP



## GSS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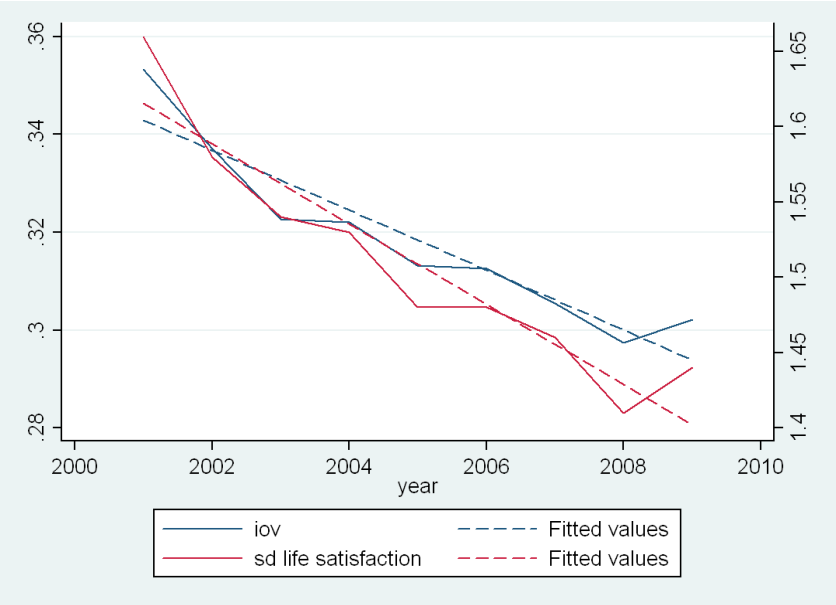
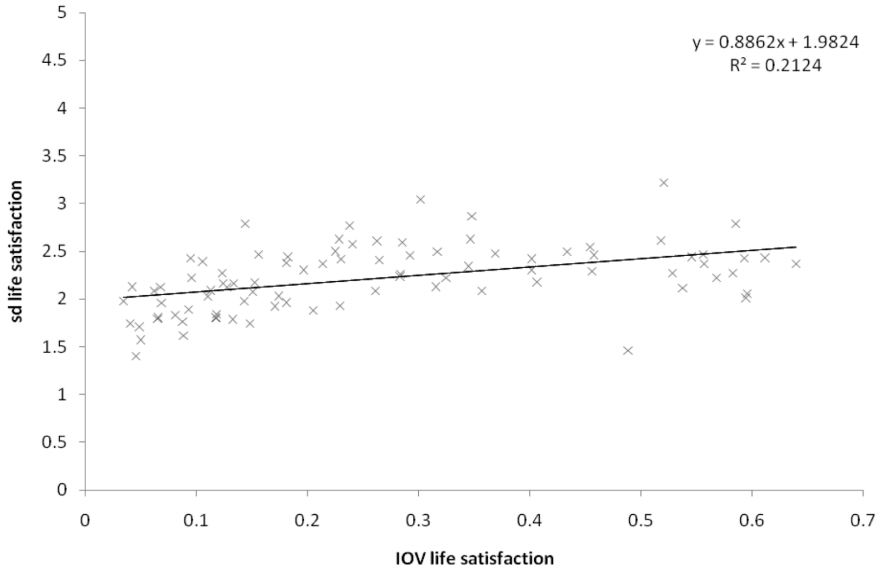
.31
.32
.33
.34
.35
.6
.62
.64
.66
.68
1970
1980
1990
2000
2010
year
iov
sd happiness
Fitted values
Fitted values

## HILDA


.28
.3
.32
.34
.36
1.4
1.45
1.5
1.55
1.6
1.65
2000
2002
2004
2006
2008
2010
year
iov
sd life satisfaction
Fitted values
Fitted values

## WVS : Joint distribution of IOV and standard deviation of Life satisfaction

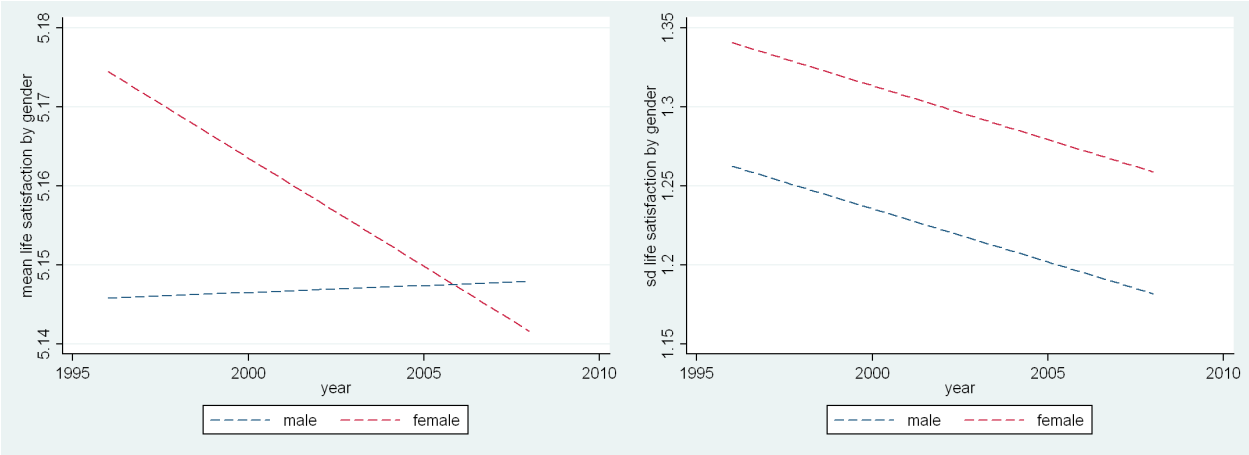


# A3 Variance decomposition by demographic groups

## *Variance decomposition BHPS*

### Gender

**Between**

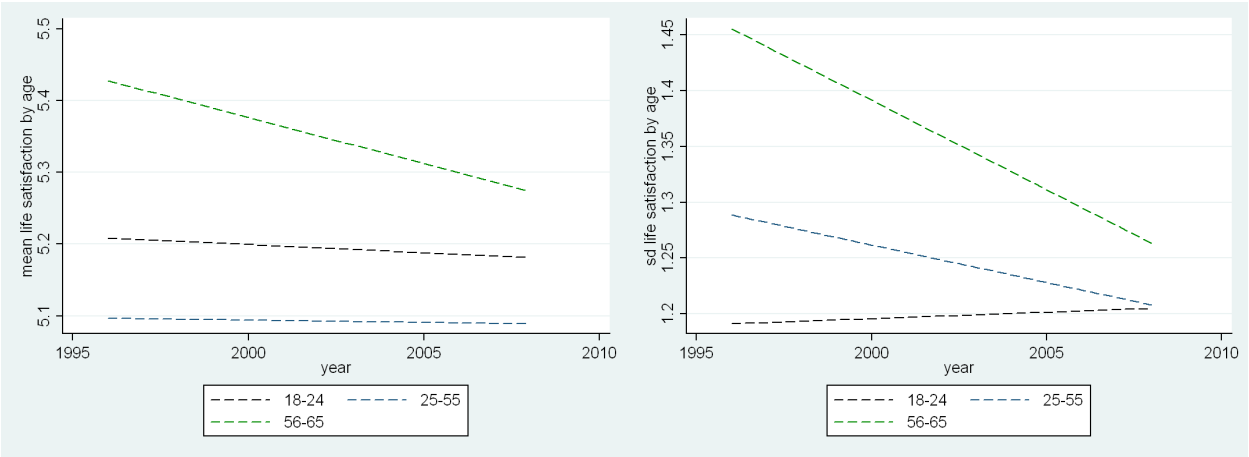



**Within**




### Age

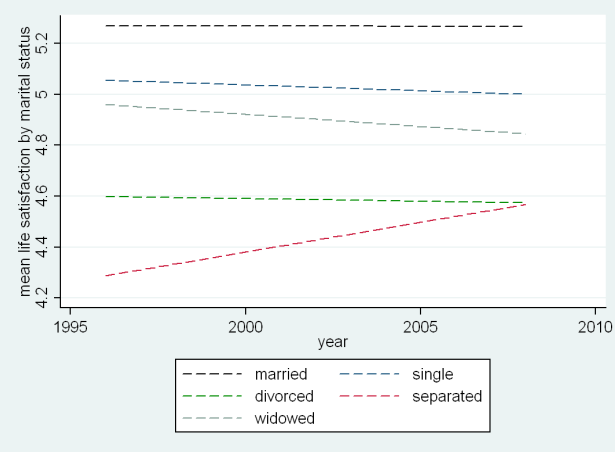
**Between**



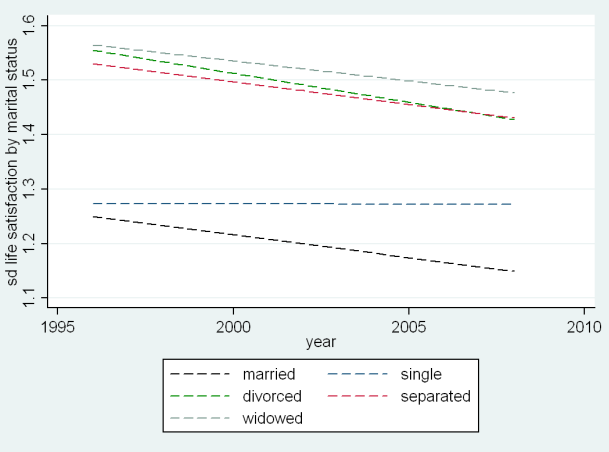

**Within**

## Marital status

**Between**

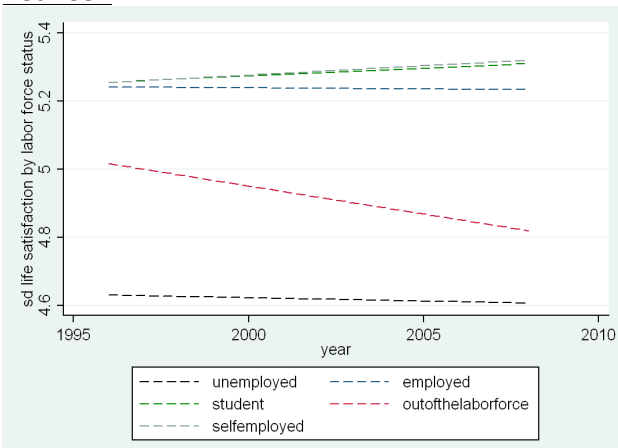



**Within**




## Labor force status

**Between**

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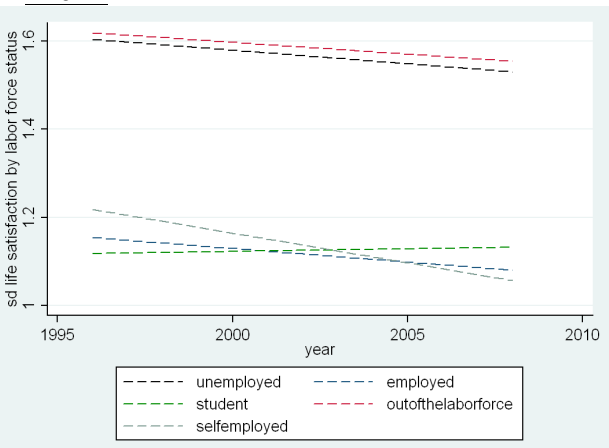
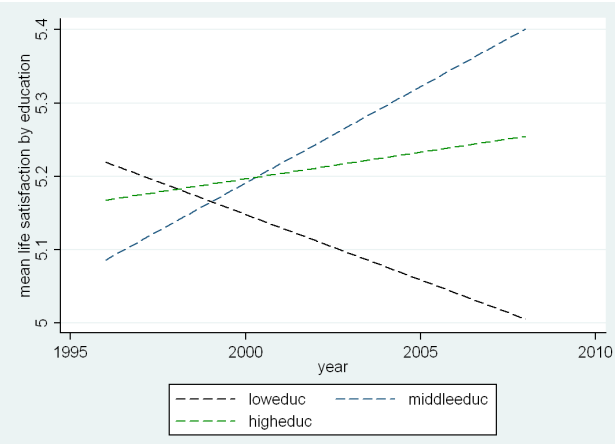



## Education

**Between**

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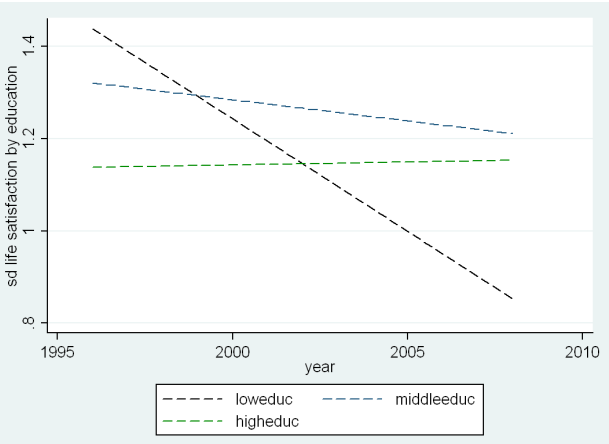
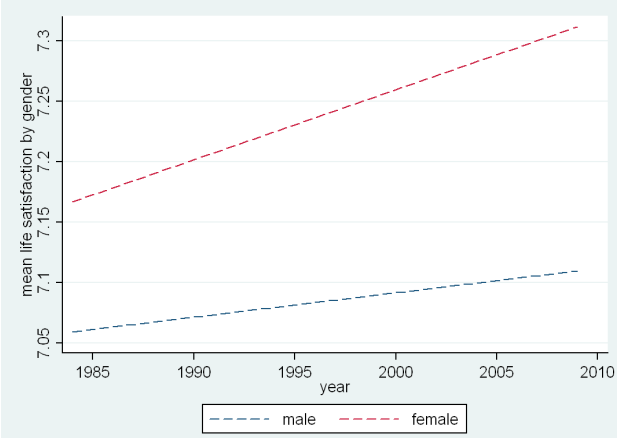


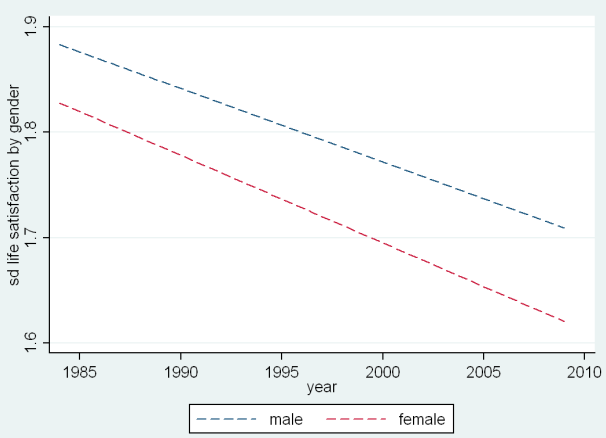
# *Variance decomposition GSOEP*

## Gender

**Between**

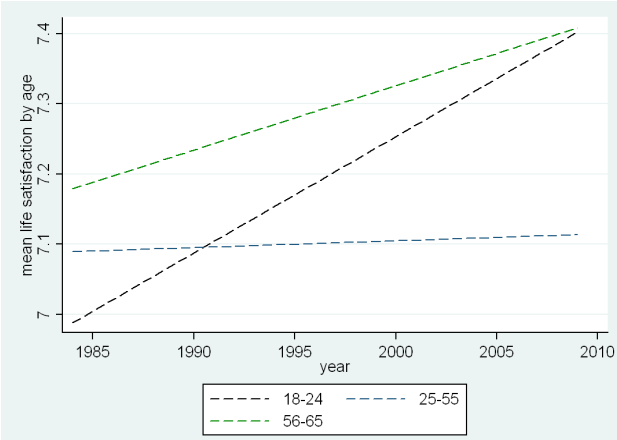



**Within**

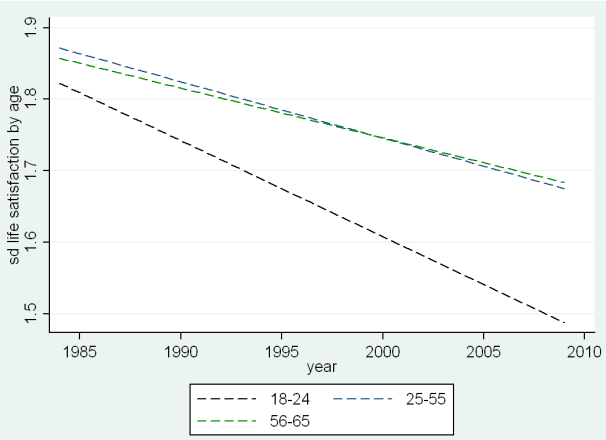



## Age

**Between**

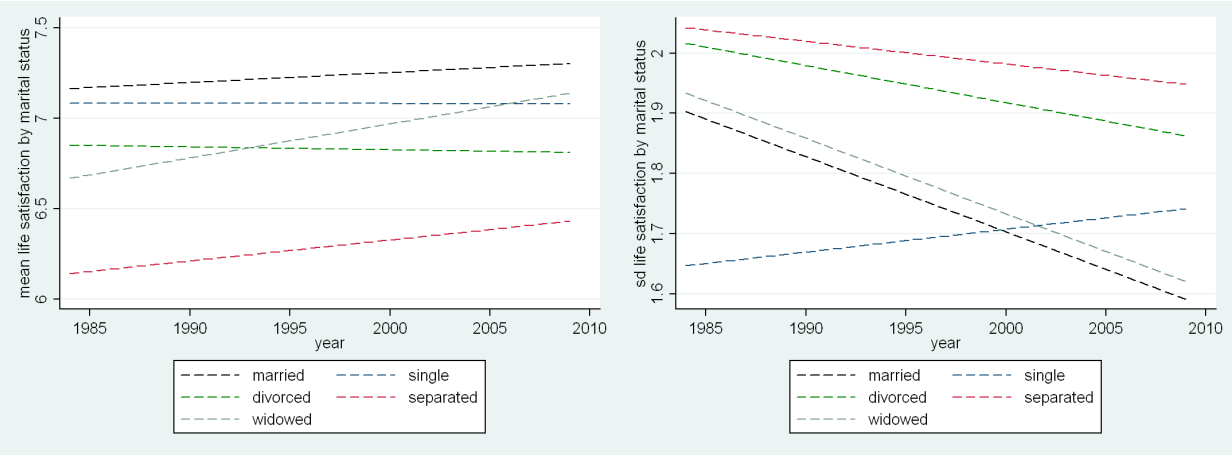



**Within**



## Marital status

**Between**

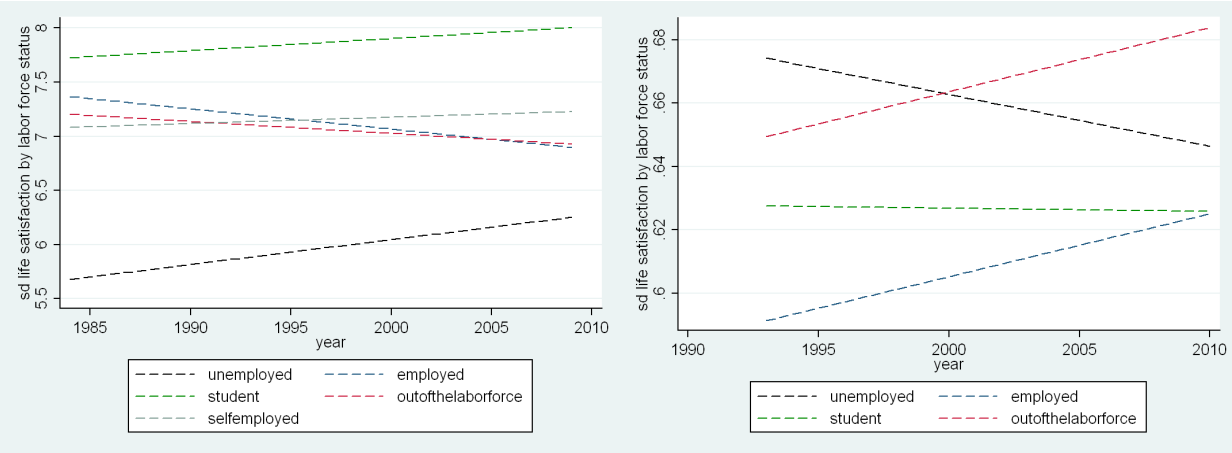



**Within**



## Labor force status

**Between**

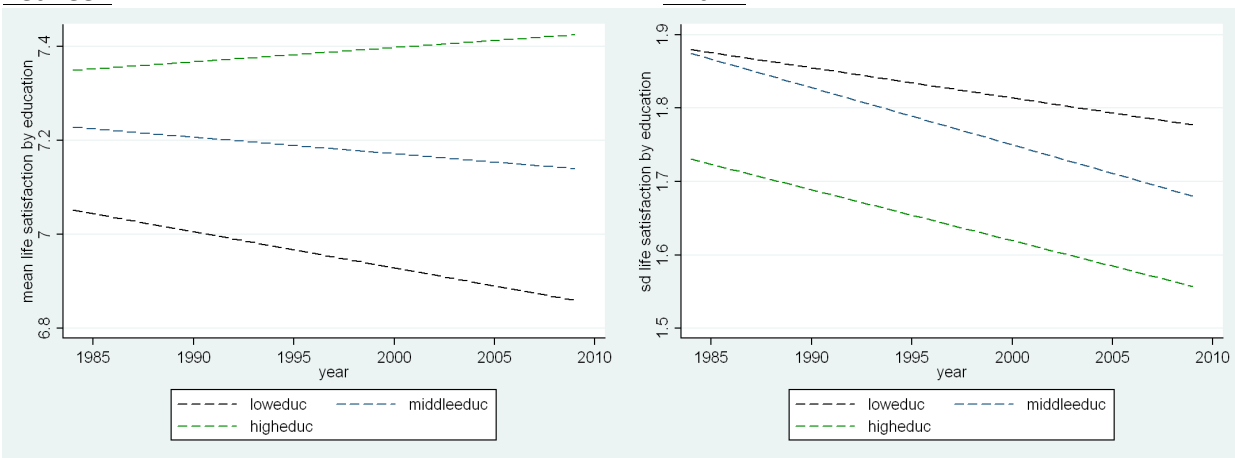



**Within**



## Education

**Between**




**Within**

## *GSOEP : 1984-1990*

### Gender

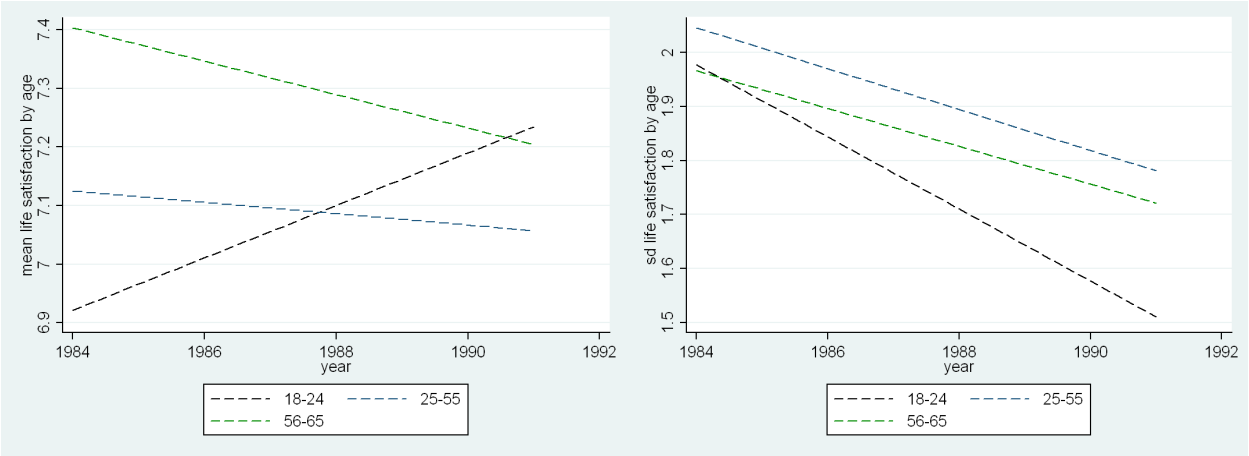
**Between**

**Within**




### Age

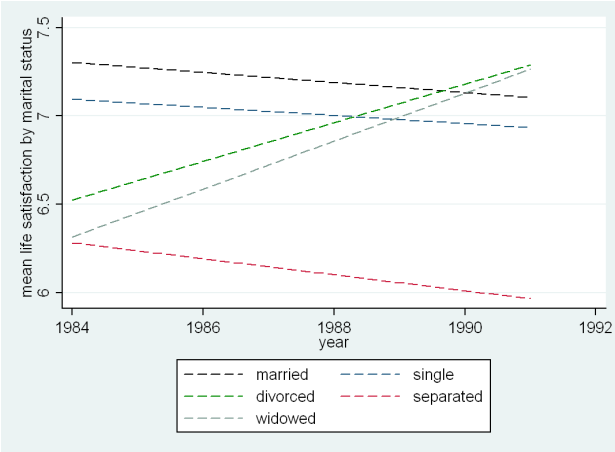
**Between**



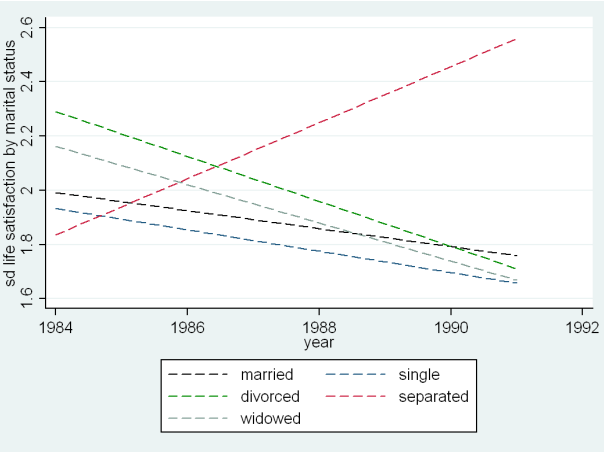

**Within**

## Marital status

**Between**

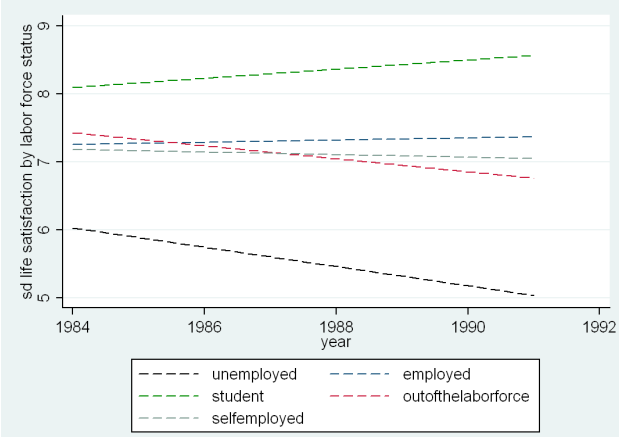



**Within**

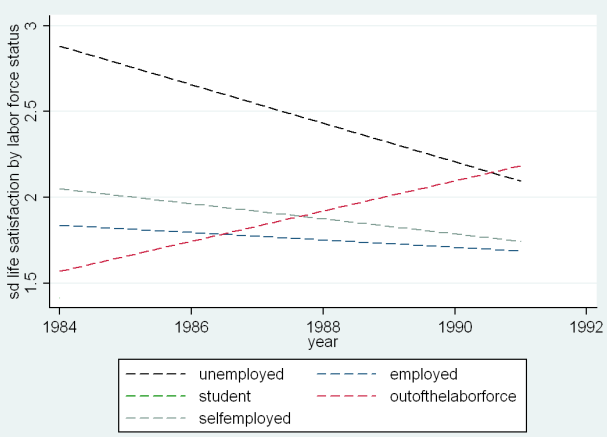



## Labor force status

**Between**




**Within**

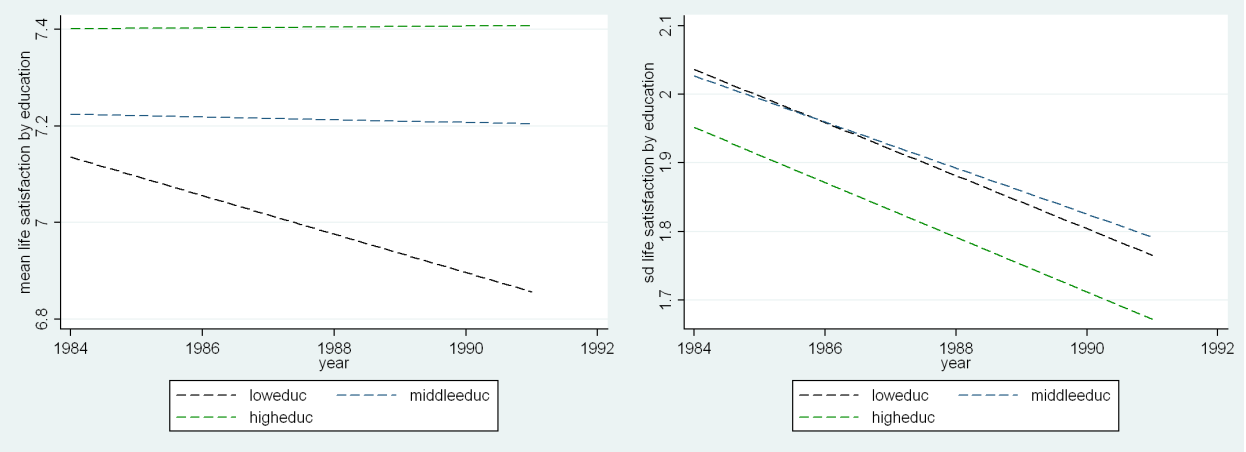


## Education

**Between**




**Within**



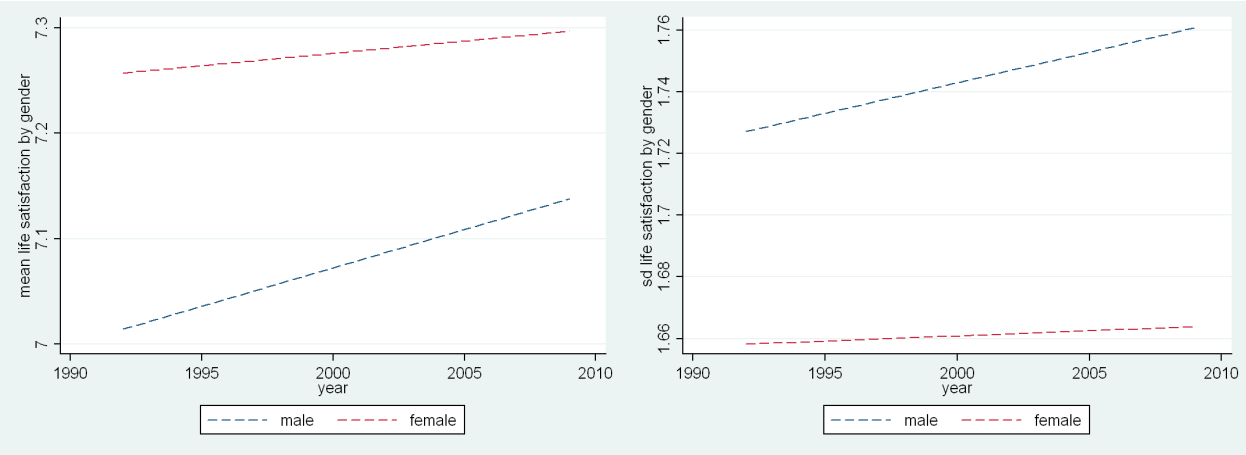

# *GSOEP 1992-2010*

## Gender

**Between**

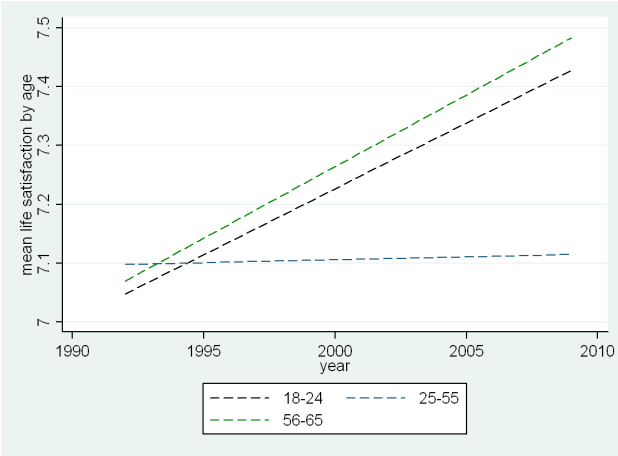



**Within**



## Age

**Between**

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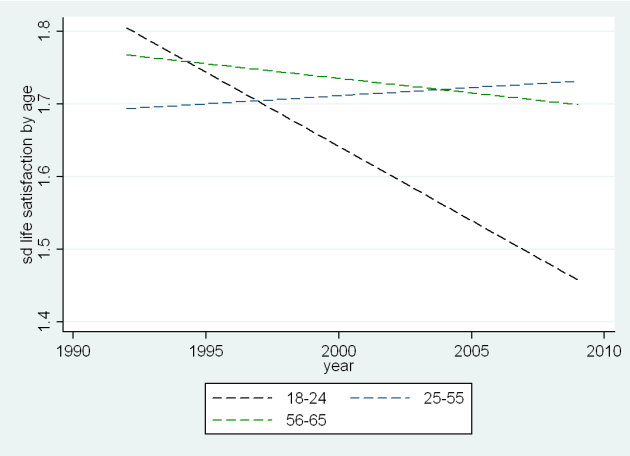
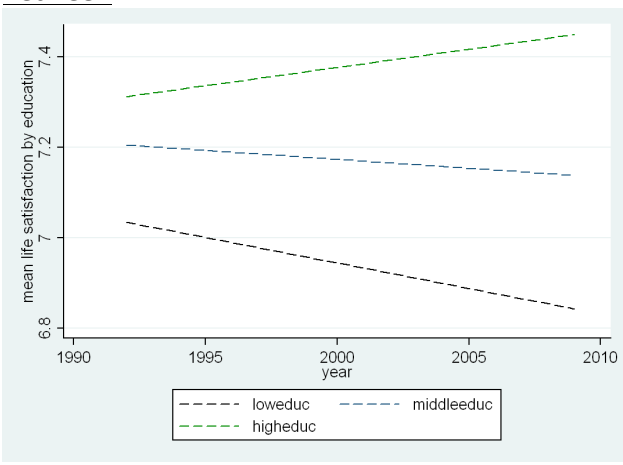
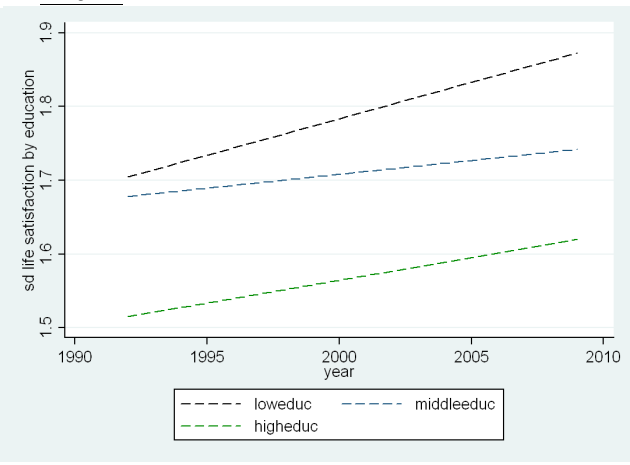



## Education

**Between**

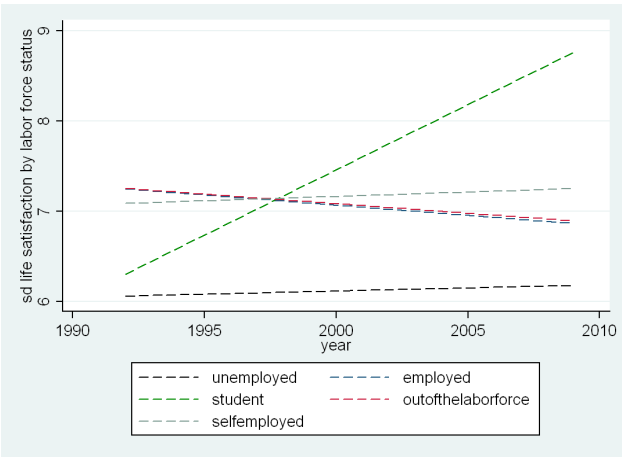



**Within**




## Labor force status

**Between**

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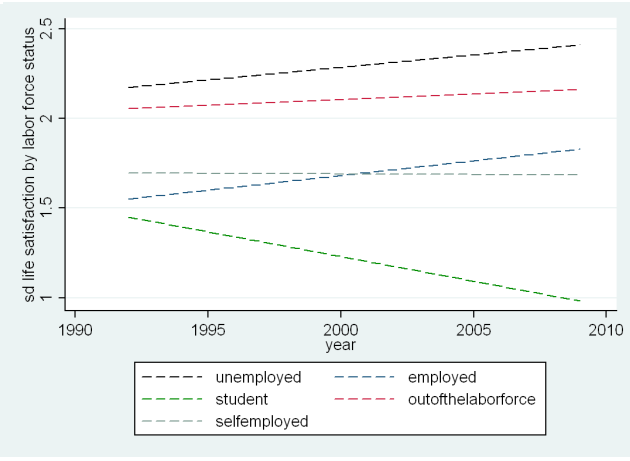
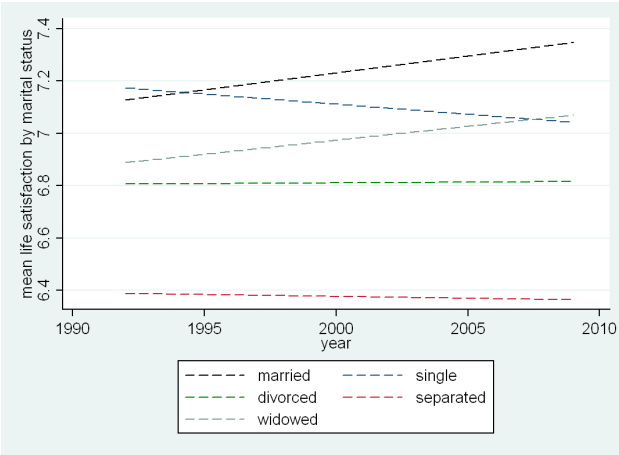


## Marital status

**Between**

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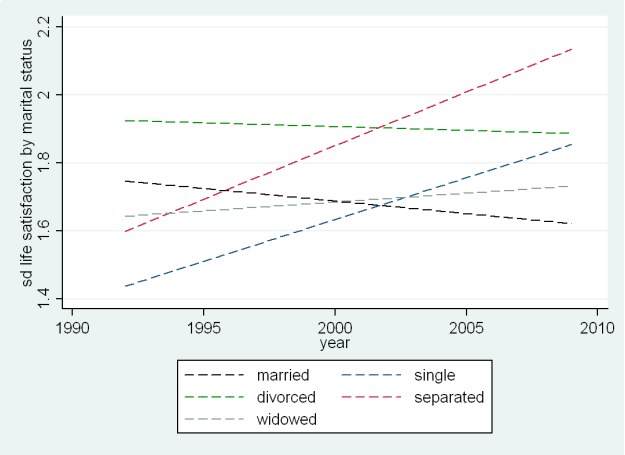
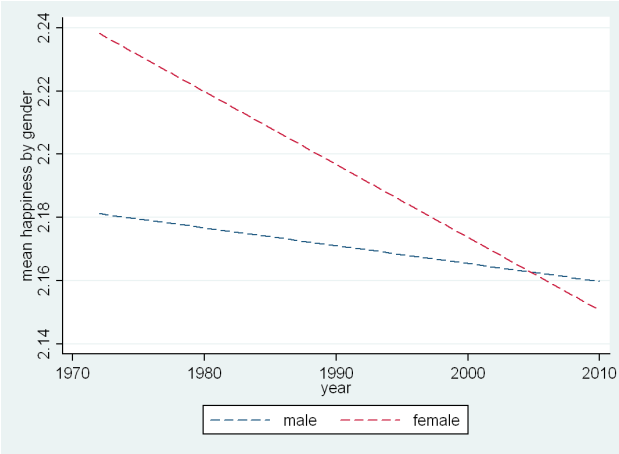


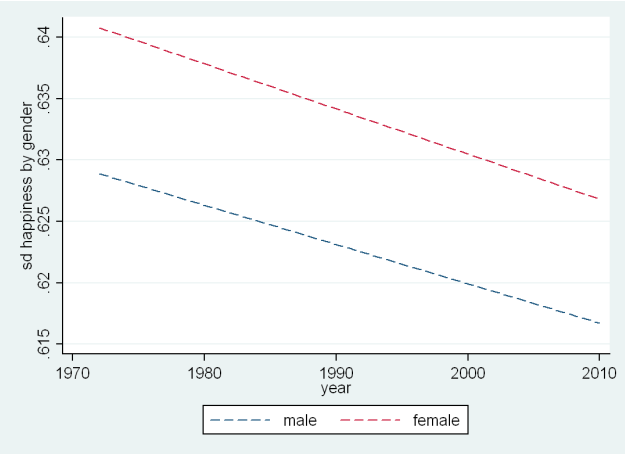

# *Variance decomposition GSS*

## Gender

**Between**

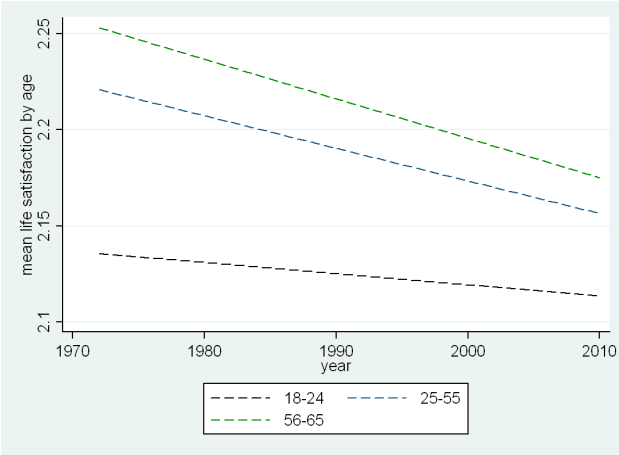



**Within**



## Age

**Between**

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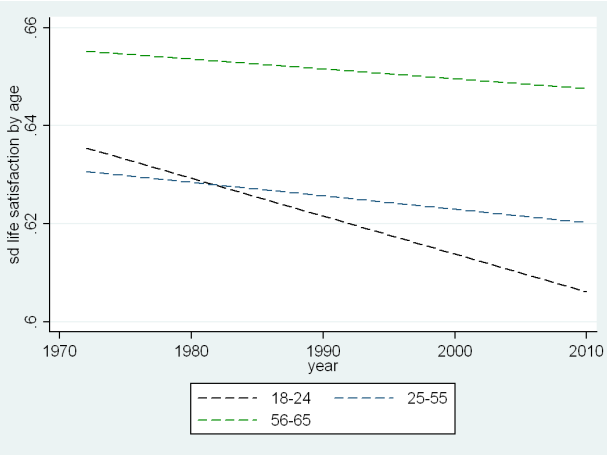
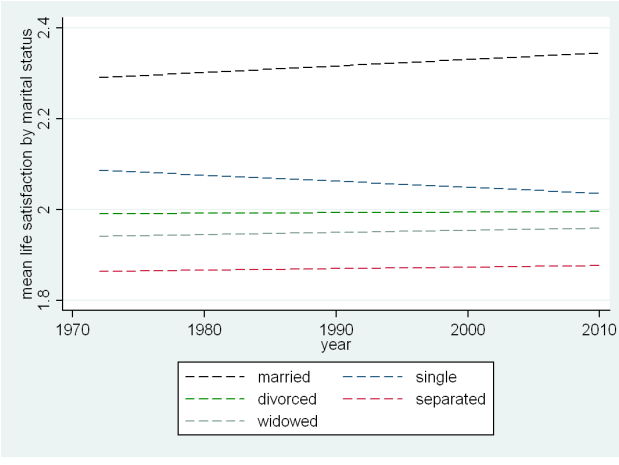



## Marital status

**Between**

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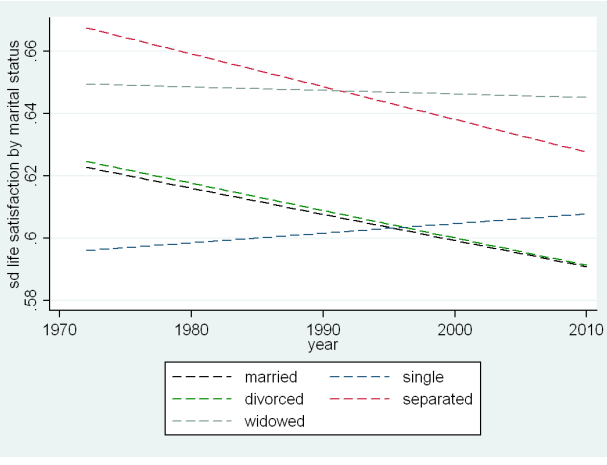
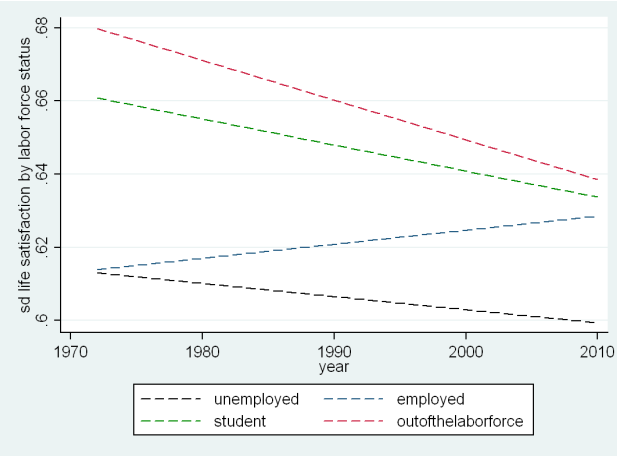


## Labor force status

**Between**

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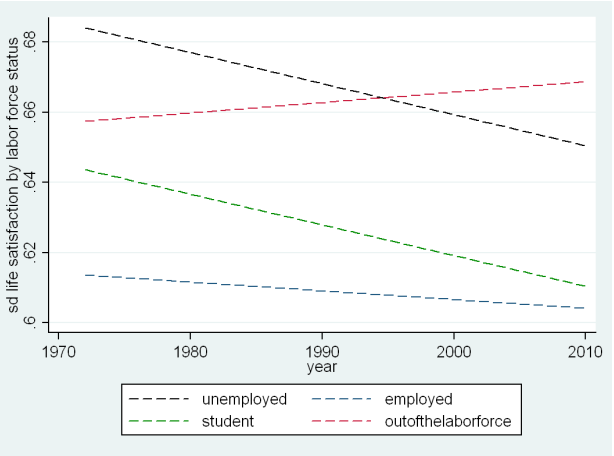


## Education

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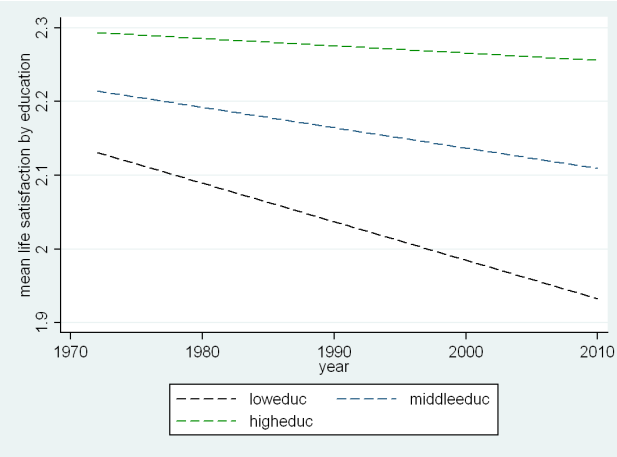


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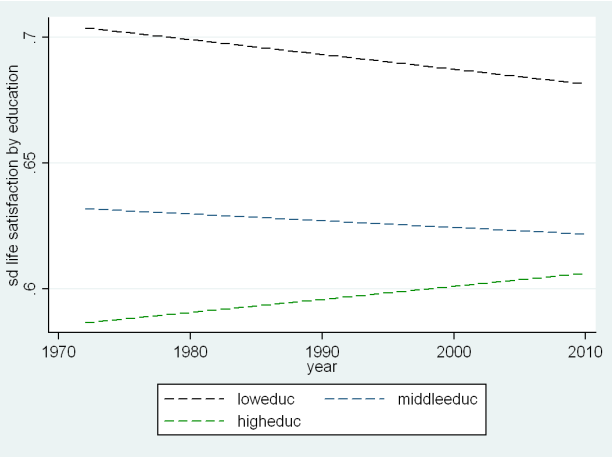
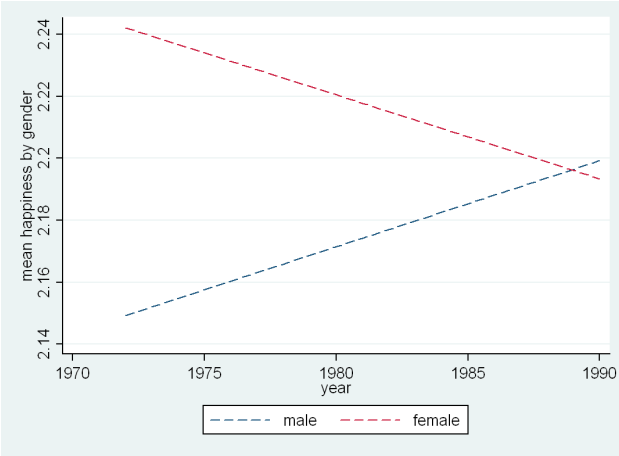


## *Two sub-periods in GSS*

### 1) 1970-1990

### Gender

**Between**

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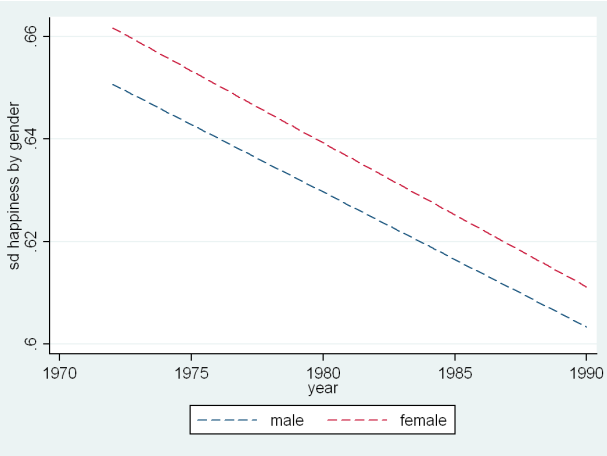


### Age

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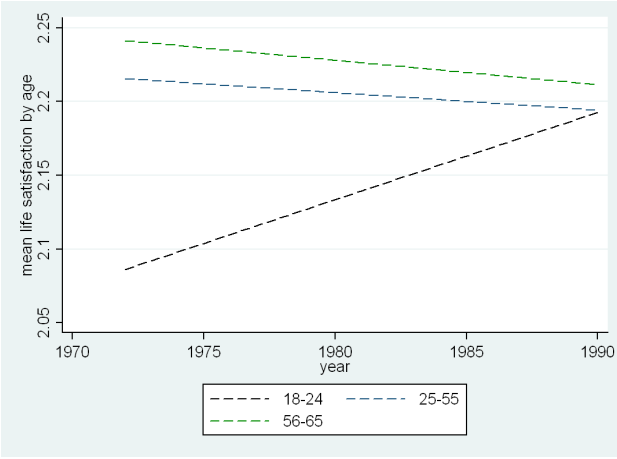


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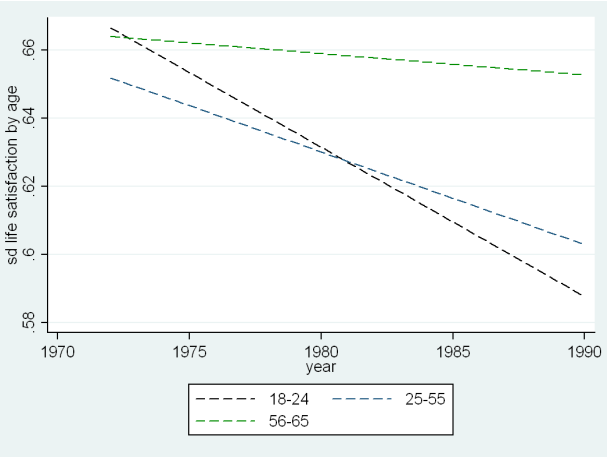

## Marital status

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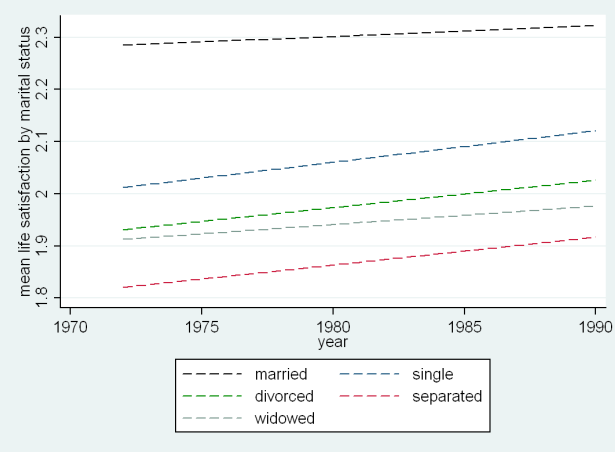


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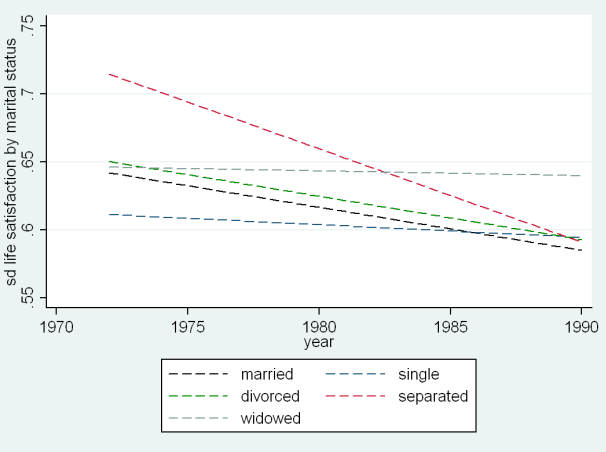


## Education

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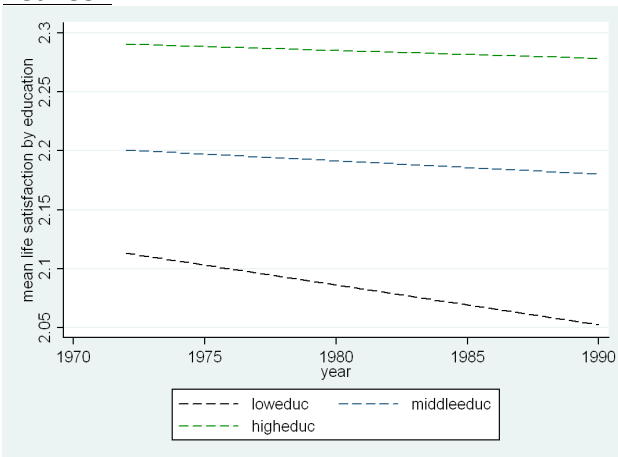


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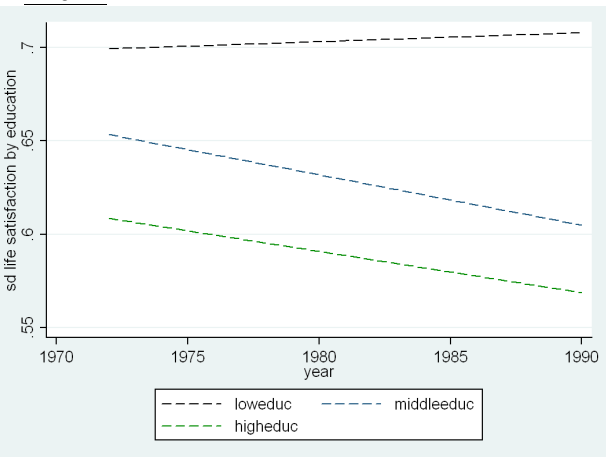
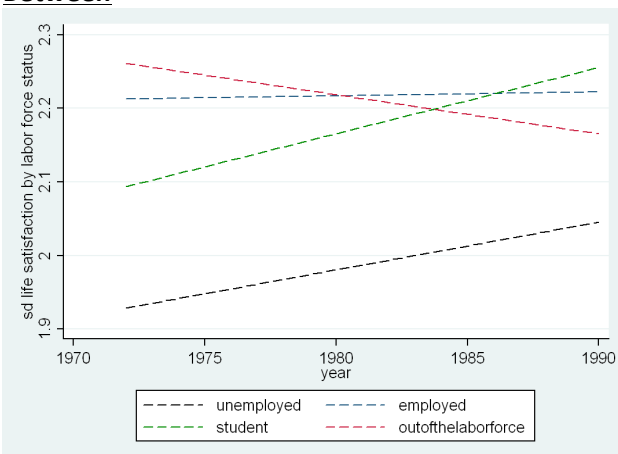



## Labor force status

**Between**

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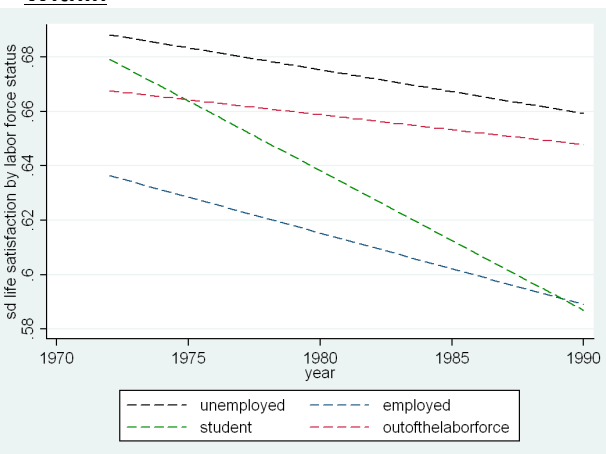
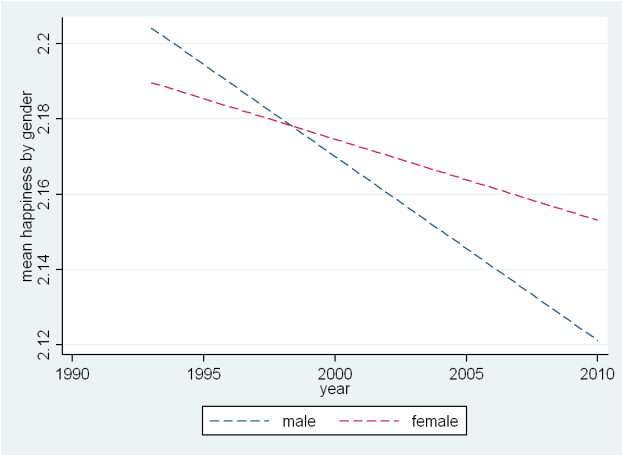


## 2) GSS: 1991-2010

## Gender

**Between**

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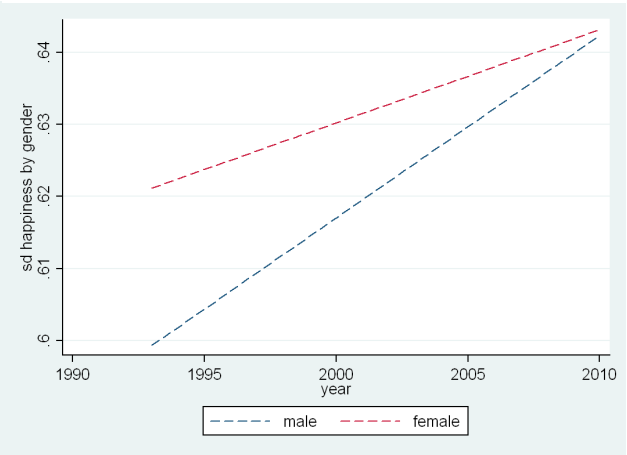


## Age

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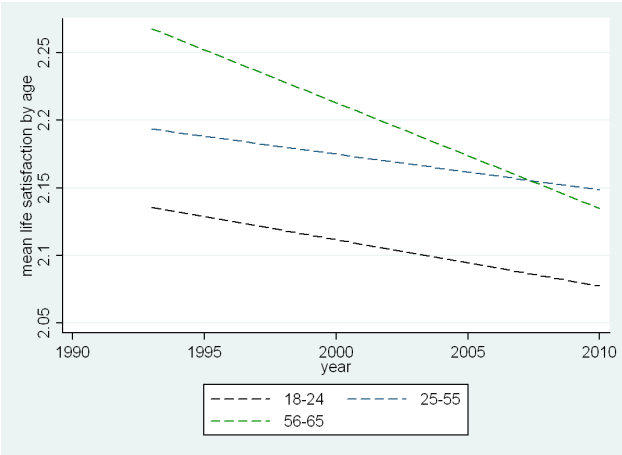


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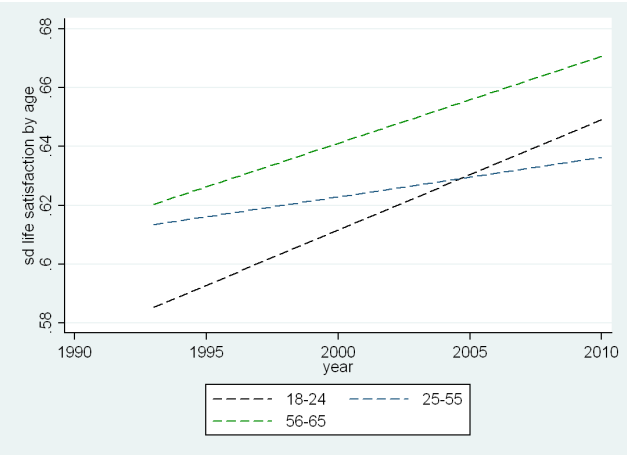
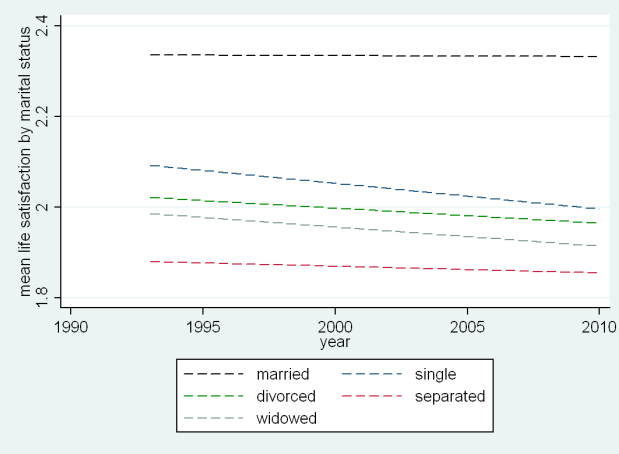


## Marital status

**Between**

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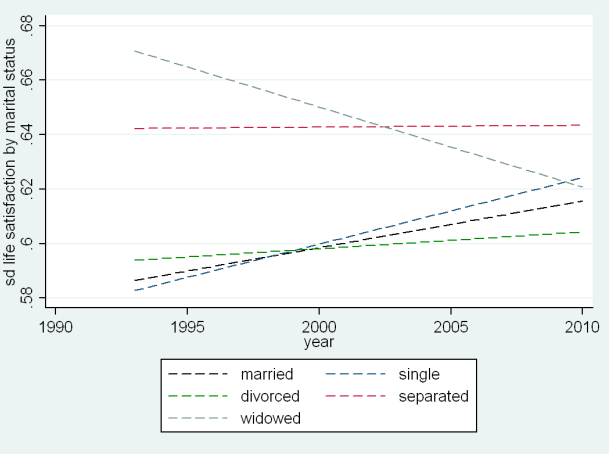
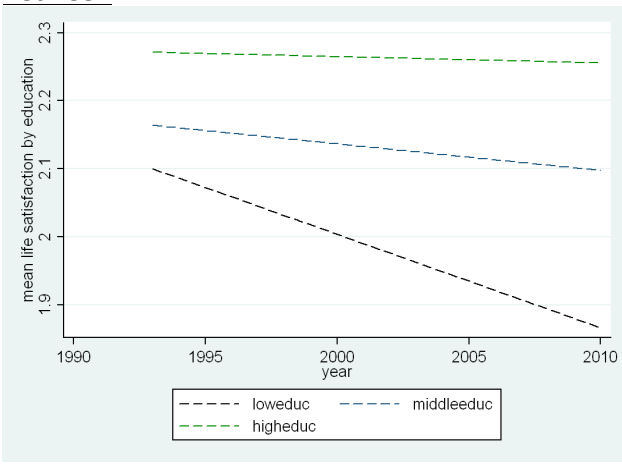



## Education

**Between**

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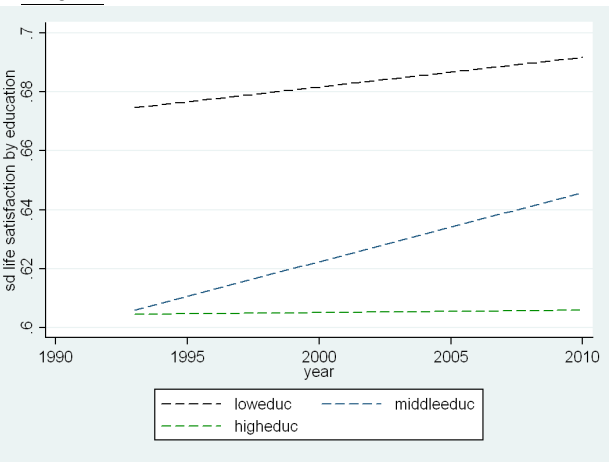
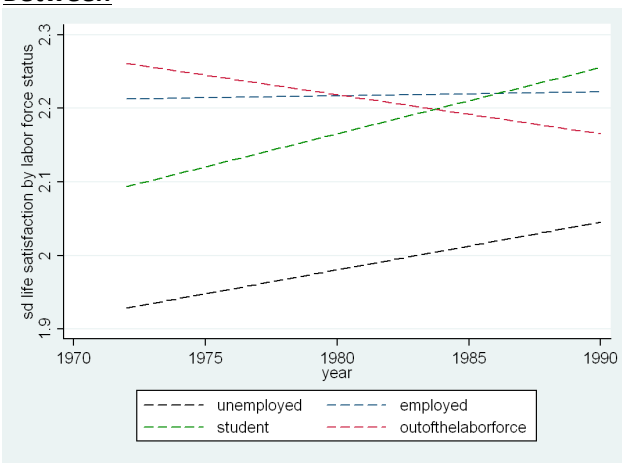



## Labor force status

**Between**

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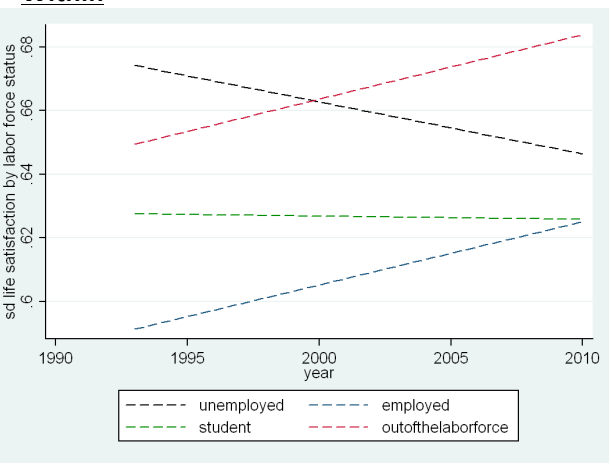
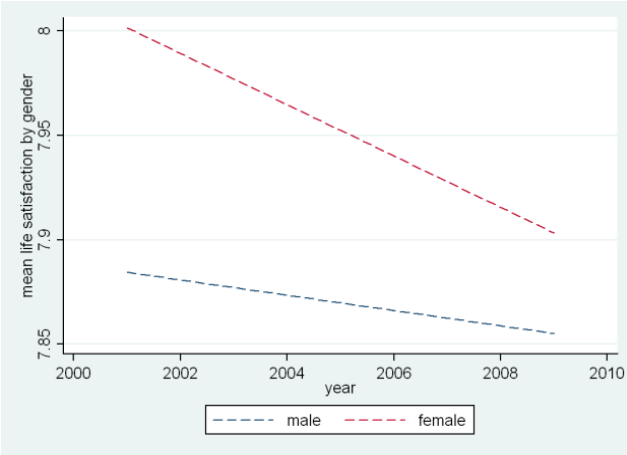


# *Variance decomposition HILDA*

## Gender

**Between**

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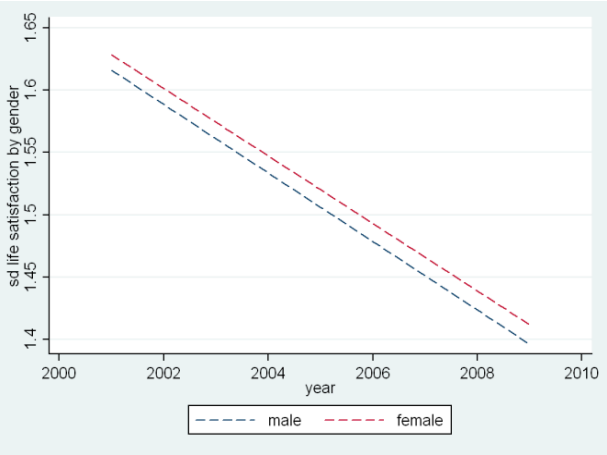


## Age

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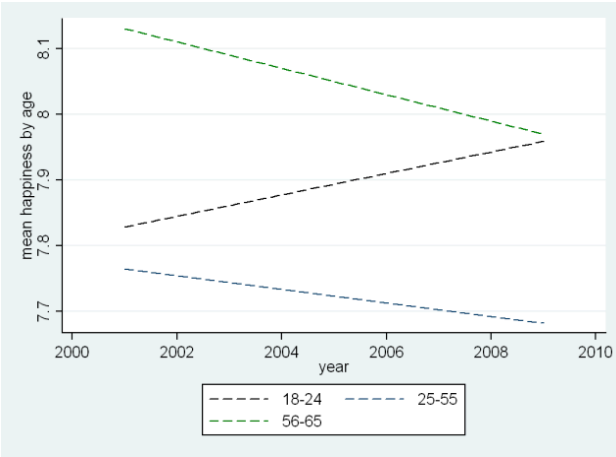


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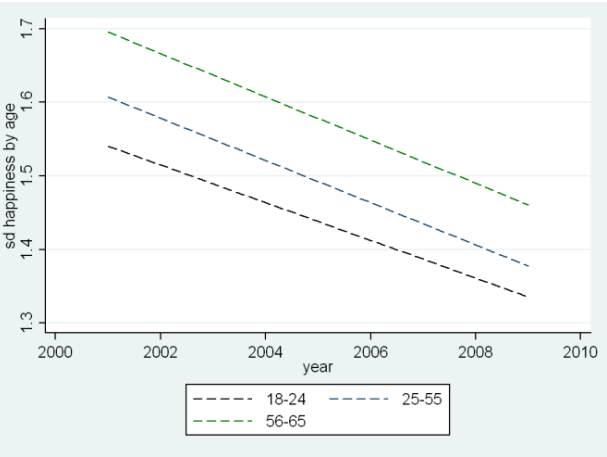

## Labor force status

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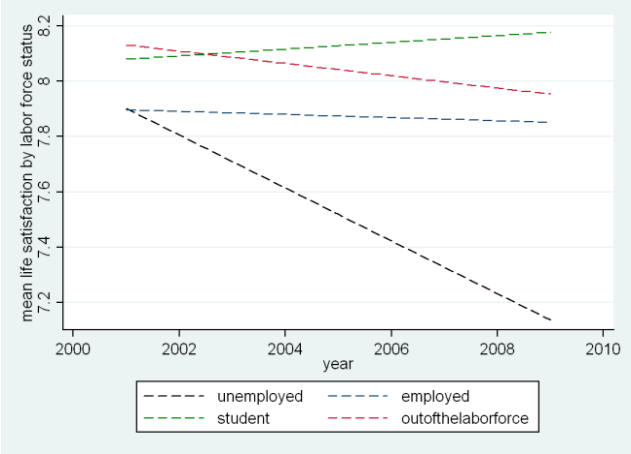


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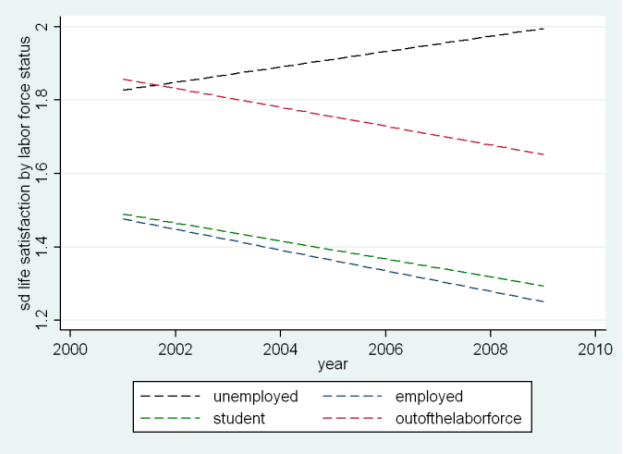
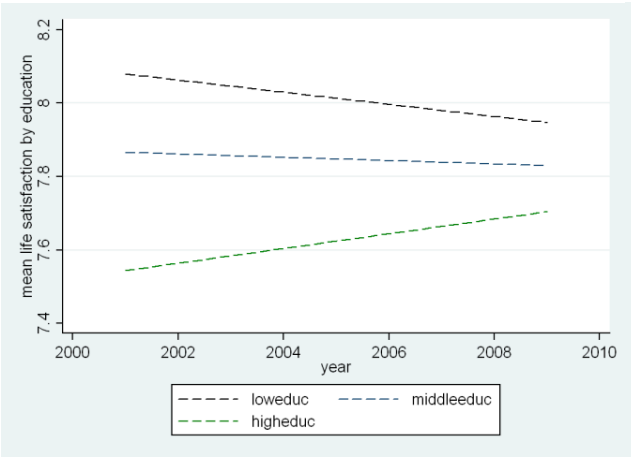



## Education

**Between**

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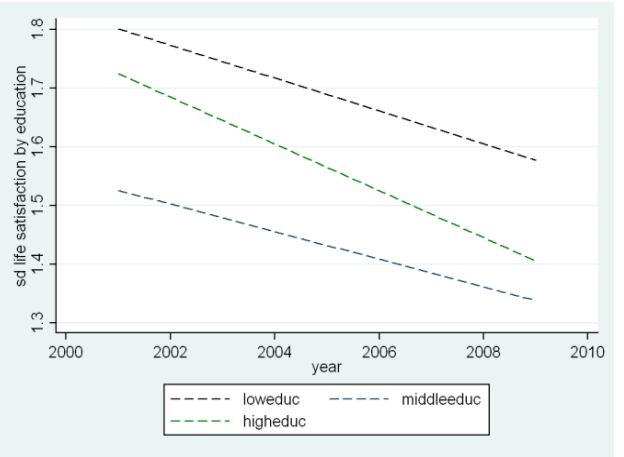
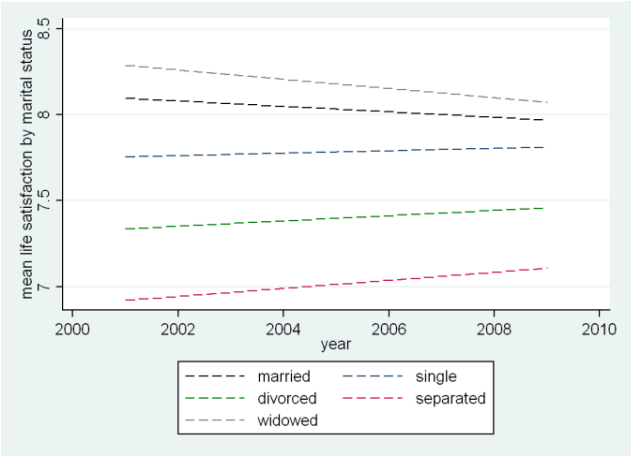
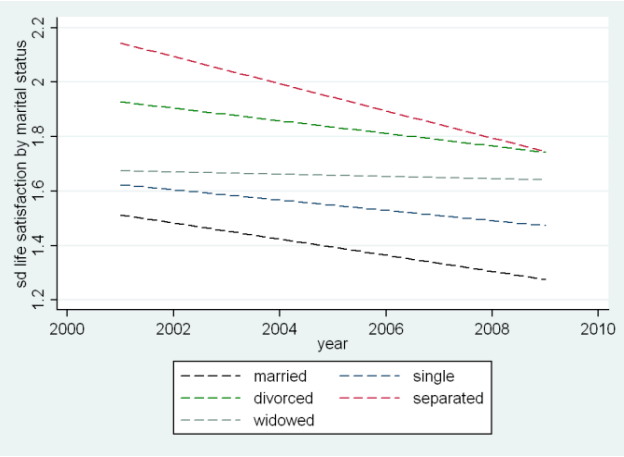



## Marital status

**Between**

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