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**The Macroeconomics of
Happiness**

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The Macroeconomics of Happiness*

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Abstract

A large literature in macroeconomics assumes a social objective function, $W(\pi, U)$, where inflation, π , and unemployment, U , are bads. This paper provides some of the first formal evidence for such an approach. It uses data on the reported well-being levels of approximately one quarter of a million randomly sampled Europeans and Americans from the 1970's to the 1990's. After controlling for personal characteristics, year dummies and country fixed effects, we find that the data trace out a $W(\pi, U)$ function. It is approximately a linearly additive "misery index". The paper calculates the implied dollar value of a low inflation rate. It also examines the structure of happiness equations across countries and time.

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I. Introduction

Modern macroeconomics textbooks rest upon the assumption of a social welfare function defined on inflation, π , and unemployment, U .¹ To our knowledge, no formal evidence for such a function, $W(\pi, U)$, has ever been presented in the literature.² Instead the approach has become common because it is tractable and seems to accord with what most politicians and some economists believe. Although an optimal policy rule cannot be chosen unless the parameters of the presumed $W(\pi, U)$ function are known, that has not prevented the growth of a large theoretical literature in macroeconomics.

This paper presents evidence that people's well-being is a decreasing function of the inflation rate and the unemployment rate, and it estimates the size of these effects. To do so, the paper employs data of a kind more commonly used in the psychology literature. The data come from random samples of individuals from many countries. Collected in standard economic and social surveys, they provide self-reported measures of well-being, such as responses to questions about how happy and satisfied individual respondents are with their lives. Few economists have looked at this form of information, but, as shown below, the patterns in these data seem - unknown to the respondents completing their happiness score sheets - to trace out a $W(\pi, U)$ function of the sort that is assumed in the macroeconomics literature.

Economists are not used to working with data on reported well-being.³ In some universities, economics students are educated to believe that such data are inherently unusable. Psychologists do not share this view, and have provided evidence of what they describe as 'validation'. For example, individuals who report a high happiness or life-satisfaction score tend to smile and laugh more (Pavot et al (1991)) and tend to be rated by those around them as relatively happy (Diener (1984)). There is a large literature in psychology journals that uses well-being data. In this paper, we view happiness data with caution, but are willing to see what happens when such information is applied to economic questions. Later in the paper, we show that 'happiness equations' have the same structure in different countries, and that suicide statistics are correlated with regression-adjusted happiness levels.

Happiness is probably the ultimate human goal. Since the creation of the modern state, governments have taken the happiness of their citizens as the fundamental guiding principle for their actions. Surrogate measures - GDP growth, income distribution, unemployment and inflation - have been used by economists. But this introduces a problem. Suppose there is a policy that increases GDP $x\%$ but worsens income distribution $y\%$. How are we to know if we should adopt it? How do we know if the cost in terms of unemployment of reducing the inflation rate by $z\%$ is worth paying? More broadly, is it possible to construct "happiness estimates" that are useful to evaluate policy alternatives of this sort? What is the microeconomic structure of happiness equations? Are there systematic movements in reported happiness over time? This paper is a first attempt to answer these kinds of questions.

¹ See, for example, Blanchard and Fischer (1989), Burda and Wyplosz (1993) and Hall and Taylor (1993). Early influential papers include Barro and Gordon (1983).

² Mankiw [1997] describes the question "How costly is inflation?" as one of the four major unsolved problems of macroeconomics.

³ Easterlin (1974) began what remains a fairly small literature. Recent contributions include Ng (1996) and Frank (1985). Kahneman, Wakker and Sarin (1997) provide an axiomatic defence of experienced utility, and propose applications to economics.

Data on happiness and life satisfaction have been collected in two large survey programs: the U.S. General Social Survey (GSS), which records information on 30,000 persons living in the U.S. between 1972 and the 1990s, and the Euro-Barometer Survey Series covering 300,000 people in twelve European countries over the period 1975 to the present. Using these data, Section II looks at the structure of subjective well-being across the different countries in our sample. The first finding is that a number of personal characteristics seem to be associated in a similar way with happiness, regardless of the country involved. Thus divorce, for example, is correlated in a similar way with individual happiness if it happens in Germany or in Greece. For the thirteen countries studied here, the same is true for a number of personal characteristics such as unemployment, age, sex, number of children, income, etc.

Section III obtains a measure of the happiness in a particular year and country that is not explained by the personal characteristics of the respondents. This unexplained or residual macroeconomic happiness measure might be viewed as the happiness on which government policy is supposed to focus. The first feature of this measure of well-being is that it does not seem a random grouping of points. There are noticeable trends in some of the countries studied. For example, U.S. happiness seems stationary, Italian life satisfaction looks to be trended upwards, while Belgians are, on the whole, apparently getting more dissatisfied with their lives. A second feature is that the data seem to follow a cycle around trend. For this reason, we estimate autoregressive models for the individual countries. For eight of the eleven countries where we have long enough series to study this type of process, there are significant autoregressive components.

Using a panel analysis of nations, Section IV tries to measure the costs of inflation and unemployment. A number of countries have implemented reforms to root out inflation even at large costs in terms of unemployment. What justifies these decisions? Some economists have criticised such actions and have called for somewhat looser policies.⁴

In Section IV we explore the economic determinants of our measure of unexplained happiness. The focus is on four variables: inflation, unemployment, growth and unemployment benefits. The paper provides an estimate of the effect of inflation on well-being that can be compared with the effect of growth or unemployment on happiness. This allows us to compute the implicit social marginal rates of substitution. The regression results seem to indicate that people find inflation very costly and would be willing to undergo a considerable recession to get rid of the price increases.

Section V concludes.

II. Happiness and Life-Satisfaction Microeconomic Equations

Happiness Equations

The U.S. data come from the United States General Social Survey [1972-1994]. Different individuals are interviewed each year and asked "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?". The three relevant response categories for the later analysis are: "Very happy", "Pretty happy" and "Not too happy" (Small "Don't

⁴ A recent contribution to this debate in the U.S. is Krugman's piece "Stable Prices and Fast Growth: Just Say No", *The Economist* 31st August, 1996. Oswald (1997) also discusses unemployment policy.

know" and "No answer" categories are not included in our data set). The European data come from the Euro-Barometer Survey Series [1975-1986].⁵ The happiness question here asks "Taking all things together, how would you say things are these days--would you say you're very happy, fairly happy, or not too happy these days?". The three relevant response categories are: "Very happy", "Fairly happy" and "Not too happy" (The rarely-answered "Don't know" and "No answer" categories are again not included in the data). The number of years where the happiness question was asked in Europe is shorter (12 years instead of 23) but the number of people interviewed was larger (108,802 instead of 26,668). Appendix I contains data sources; appendix II has the data definitions; appendix III describes the data.

We begin with cross-tabulations. In Tables I and II, the frequency proportions of respondents in the various happiness response categories are summarized by employment status, marital status, sex and income quartile. Unemployed people are relatively unhappy. A higher proportion of married respondents report themselves as being "Very happy" compared to divorced respondents. As we proceed from the lowest to the highest income quartiles, there is a monotonically increasing proportion of responses which lie in the "Very happy" category and a monotonically decreasing proportion of responses which lie in the "Not too happy" category. Tables III and IV present microeconomic happiness equations (one for the U.S. and one for the whole of Europe). These are ordered probit equations that include a dummy for the country where the respondent lives and a dummy for the year when the survey was carried out. Comparing the happiness equations for Europe and the U.S., two features seem to stand out. The first is that the same personal characteristics are statistically associated with happiness in Europe and the U.S.. Second, the size of the effects do not vary much between the U.S. and Europe.⁶ The effect of employment status, being a widow, and income (all three categories), for instance, are similar across the U.S. and Europe. Blanchflower et al (1993) present a happiness regression for the U.S. between 1972 and 1990 with equivalent results.

According to Tables III and IV, the following personal characteristics are positively associated with happiness, and are statistically significant, in both Europe and the U.S.: being employed, female, young or old (not middle aged), educated, married (not divorced, not separated nor a widow), with few children, or belonging to a high income quartile. Separate happiness regressions for each of the European countries largely repeat these results. Being unemployed is associated with lower reported happiness levels in every European country. The estimated effect in Spain, however, is not statistically significant at the 5% level.⁷

Life Satisfaction Equations

Data on life satisfaction come from a Euro-Barometer Survey Series [1975-1991] question which asks: "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?". The four relevant response categories are: "Very satisfied", "Fairly satisfied", "Not very satisfied" and "Not at all satisfied" (The "Don't know" and "No answer" categories are not included in our data set). Happiness and life satisfaction are correlated. The correlation coefficient is

⁵ The Eurobarometer question on happiness was not asked after 1986.

⁶ This similarity cannot be read directly from an ordered probit but has to be checked by simulating one-unit changes.

⁷ The individual country regressions are available from the authors.

0.56 for the period 1975-86. Table V presents the frequency proportions for the various life satisfaction response categories depending on the employment state, marital status, sex and income quartile of respondents.

Tables VI and VII show the results from the estimation of life satisfaction equations - one for the whole of Europe, and also ones for the United Kingdom, France, Germany and Italy. Equations for the remaining European countries are in Appendix IV.⁸ Again these are ordered probit regressions and include region and year dummies. Once more there is a similar structure across European countries. Independent of the country where the respondent lives, the same personal characteristics appear to be important correlates with life satisfaction. These characteristics, in turn, work in the same way as those in the happiness equations of the previous subsection.

One piece of information relevant to policy-makers is the apparent large costs of being unemployed. For every country in Europe, being unemployed increases the chance that the respondent declares himself dissatisfied with life, even after holding other things constant that may be expected to be associated with unemployment (e.g. family income, marital separation). The size of the impact is large and similar across countries. With the exception of Luxembourg, France and Greece, being unemployed is equivalent in life dissatisfaction 'units' to dropping from the top to the bottom income quartile. For Luxembourg the effect is almost double this, while in France an individual falling unemployed is just as likely to report himself dissatisfied with his life as a person who has experienced a drop in family income that takes him from the top to the second income quartile. In Greece, unemployment is equivalent to a drop in family income from the third to the bottom income quartile. While no definitive interpretation is possible, this evidence is consistent with the commonsense idea that unemployment is a major economic source of human distress.

Males are more likely to declare themselves dissatisfied with their lives in most countries. The exceptions are four Mediterranean countries: Italy, Portugal, Spain and Greece. There is again evidence that life satisfaction is U-shaped in age, with the coefficients similar across countries. The coefficient on self-employed is significantly different from zero and negative in France, Italy, Spain, Portugal and Ireland. Married individuals are more likely to report themselves satisfied with their lives in every country except Portugal and France. Divorced individuals are more likely to report dissatisfaction with their lives in every country except Spain and Ireland, which are two of the most Catholic (and hence anti-divorce) countries in our sample. The only country where separation is not associated with an increased chance of becoming more dissatisfied with life is Spain and the only place where becoming a widow has a similar effect is Northern Ireland. Having children tends to be associated with an increased chance that the respondents are dissatisfied with life, although the effect is not always statistically significant.

Finally, for every country studied, having family income classified in a higher income quartile increases the likelihood that a respondent is satisfied with life. The effect is monotonic and the coefficients are similar across countries.

⁸ The regression for Europe in Table VI is based on data for 149,274 employed and unemployed workers. The regressions for each European country in Table VII and Appendix IV are based on a total of 270,150 observations, which includes persons out of the labour force.

III. Happiness Cycles

The previous section reports coefficients from pooled cross-section equations. While the microeconomic structure of well-being may be of some interest to economists, our ultimate concern is to extract country-by-year unexplained happiness components. This brings us to macroeconomics.

Using the well-being regressions described above, it is possible to measure a country's level of reported "pure happiness", that is, the average happiness level of the respondents after controlling for the influence of personal characteristics. We calculate the mean residuals, for each year and European country, from OLS happiness and life satisfaction regressions,⁹ and treat these as the dependent variable in a second-stage regression. Before this, two points are worth noting.

The first is consistent with a conclusion presented in Easterlin (1974): the lack of an upward trend in U.S. "pure happiness" in spite of rising real income in the United States (see Figure 1). Using GSS data from 1972-90, Blanchflower et al (1993) find that there is a small rise in American happiness, a result mainly driven by men getting happier. Our data show that the period 1990-94 incorporates three extra years (there was no GSS survey in 1992) that were worse than average. The effect is enough to produce a horizontal trend for American happiness over 1972-94. The life satisfaction residuals across European countries (there are happiness data in Europe only for 1975-86 and there are two missing years) exhibit an upward trend in Italy and Germany, while life satisfaction residuals in Belgium seem to have a downward trend. If anything, other European countries present a drift towards more happiness, although the effect in general is not statistically significant.

Second, there is some degree of autoregression in macroeconomic well-being data. To evaluate the validity of the hypothesis that happiness and life satisfaction behave as cycles, we estimated integrated autoregressive AR(1,1,0) functions for the U.S. and the twelve European countries. The estimating regression was of the form

$$\Delta y_{it} = c + \rho \Delta y_{it-1} + \varepsilon_{it} \quad (1)$$

In eight of the eleven countries for which we have sufficiently long time-series to analyze these processes, the coefficient on the lagged dependent variable was significantly different from zero (and negative in every country). In one of the countries the deterministic drift term, c , was significantly different from zero (and positive in every country except one). These results indicate that happiness and life satisfaction residuals seem to move smoothly together in what appear to be happiness cycles.

IV. Happiness and Life-Satisfaction Equations for a Panel of Countries

This section analyzes the impact on reported well-being¹⁰ of a country's level of income, the level of

⁹ Using residuals from the probit regressions is not feasible. It introduces issues that have not been resolved in the statistical literature. The use of OLS regressions has the well-known problem that the distance between the categories very satisfied and fairly satisfied is the same as the distance between the categories fairly satisfied and not very satisfied. Experiments suggested to us that the precise cardinalization assumed did not alter the results. For example, a binary representation of well-being led to similar equations.

¹⁰ The dependent variable can be thought of as the value of each country dummy, for each year, from a microeconomic well-being equation.

unemployment benefits, the rate of inflation in consumer prices, and the rate of unemployment. A large literature in macroeconomics assumes policy-makers maximise a social welfare function (minimise a loss function) defined over a small number of variables of interest such as output, unemployment and inflation. There is no agreement on the likely coefficients on these variables. For example:

"we shall see that standard characterizations of the policy-maker's objective function put more weight on the costs of inflation than is suggested by our understanding of the effects of inflation; in doing so, they probably reflect political realities and the heavy political costs of high inflation." (pp. 567-8, Blanchard and Fischer (1987))

Assume that life satisfaction is a function of macroeconomic variables. For a panel of European nations, consider 'second-stage' linear regressions of the form

$$LIFESATISFACTION_{it} = f(UNEMPLOYMENTRATE_{it}, GDPPERCAPITA_{it}, INFLATIONRATE_{it}, BENEFITS_{it}) \quad (2)$$

LIFE SATISFACTION is the mean residual life satisfaction in country *i* in year *t*, UNEMPLOYMENT RATE is the unemployment rate in country *i* in year *t*, GDP PER CAPITA is real income per capita in country *i* in year *t*, INFLATION RATE is the rate of change of consumer prices in country *i* and year *t*, while BENEFITS is the latest measure of the replacement rate (unemployment benefits over the wage) as calculated by the OECD for country *i* and year *t*.

A two-step methodology is thus employed. In the first step, OLS life satisfaction regressions on personal characteristics are estimated for each country in our sample. The regressions combine a total of 270,150 observations. The mean residual life satisfaction is then calculated for each year. In the second step, these country-by-year unexplained life satisfaction components are used as the dependent variable in regressions of the form given by (2).¹¹ Three-year moving averages of the explanatory variables are used. The regressions control for country and time fixed effects, and correct for heteroscedasticity using White's method.

The role of changes in our explanatory variables is also studied. In other words, linear regression forms of

$$LIFESATISFACTION_{it} = h(VR_{it}, \Delta VR_{it}) \quad (3)$$

are estimated, where VR is a vector of the four variables of interest, and ΔVR is included to determine the effect of changes in these variables.

Table IX presents the key empirical results. Regression (1) studies the dependence of the life satisfaction residuals on the unemployment rate, the rate of inflation, the level of unemployment benefits and GDP per capita. The coefficients from regression (1) in Table IX imply that higher unemployment and inflation rates decrease life satisfaction, but that higher unemployment benefits

¹¹ We do not include Northern Ireland as respondents from there are already represented in the United Kingdom sample. Luxembourg is dropped since there are no data on unemployment benefits.

increase life satisfaction. These coefficients are significant at the 1% level. There is a weak effect of higher income per capita being associated with higher life satisfaction.

Regression (1) of Table IX suggests that the coefficients on the inflation rate and the unemployment rate are fairly similar, so that life satisfaction might be reasonably well-approximated by a simple linear misery function, $W=W(+U)$. Consequently, regression (2) explores the explanatory power of the variable, MISERY, defined, as in the macroeconomic literature, as the linear addition of the inflation rate and the unemployment rate. Higher levels of the misery index are associated with decreased life satisfaction, an effect which is significant at the 1 per cent level. Furthermore, higher income per capita is positively associated with life satisfaction in regression (2) with a significance level of 5 per cent.

Regression (3) of Table IX tests a more general specification which includes both a lagged dependent variable and the effect of changes in the explanatory variables. Both a higher level and rate-of-change of inflation are negatively correlated with life satisfaction, significant at the 5 per cent level. Higher levels of unemployment also imply significantly decreased life satisfaction. On the other hand, both a higher level and rate of change in income per capita and benefits have positive coefficients. These are not especially well-defined. Regression (4) tests for the significance of the misery index in the general specification. The level and rate of change in the misery index are statistically significantly different from zero at the 5 per cent level. Whereas Easterlin (1974) argues that economic growth does not appear to improve the human lot, we find that a higher level of national income is associated with higher levels of reported well-being.

Perhaps the most interesting comparison is that between unemployment and inflation. Using the coefficients on the inflation and unemployment rates in regression (3) of Table IX, a country that wishes to eradicate an inflation rate of 10% per annum is ready to bear a 9 percentage point higher unemployment rate. Thus, the regression results provide some support for a simple misery index, and indicate that inflation is costly and people are willing to undergo a considerable increase in unemployment to get rid of price increases.¹²

In US dollars, a person would on average have to receive approximately \$150 (in 1985 dollars) in extra income per capita to compensate for having an inflation rate 1 percentage point higher. Alternatively, 1 percentage point of inflation corresponds to a cost of approximately 2 per cent of the level of income per capita, averaged across the countries and years in the panel. This cost is significantly larger than the amounts calculated using the traditional partial equilibrium approach, developed by Bailey (1956) and Friedman (1969), which measures the welfare cost of inflation by computing the appropriate area under the money demand curve. Using this method, Fischer (1981) and Lucas (1981) find the cost of inflation to be surprisingly low, at 0.3 per cent and 0.45 per cent of national income, respectively, for a 10 per cent level of inflation.

Using the coefficients on income per capita and unemployment, a 1 percentage point drop in the unemployment rate is worth approximately \$165 (in 1985 dollars). A 1 percentage point increase in the unemployment rate, on the other hand, requires a 3 percentage point increase in the replacement

¹² Before doing this analysis, we had shared the common economists' view that non-economists over-estimate the cost of inflation.

rate to compensate individuals with higher insurance for the higher risk they must now bear.

This evidence suggests, contrary to some economists' hunches, that inflation is an important determinant of well-being. Unemployment is also costly, even after controlling for individuals' employment or unemployment. Because the direct costs of unemployment on an individual are not included, the misery index underestimates the total cost of unemployment. These results provide some of the first econometric support for the macroeconomics literature's assumption that social well-being depends on inflation and unemployment.¹³

Four Checks on the Results

A number of checks of robustness were done.

1. The Unemployed, the Employed and Life Satisfaction

This section examines the effect of the explanatory variables separately on the life satisfaction of the unemployed and the employed. This is to see if inflation and unemployment have a similar impact across the two groups. We start by calculating the life satisfaction residuals (to control for personal characteristics of the respondents) for the unemployed and the employed.¹⁴

Regressions (5) to (8) in Table X present life satisfaction regressions for the unemployed. The level of unemployment benefits is statistically significant and economically large in all four regressions. The estimated effects of the unemployment rate are also significant and large, with both a higher level and rate of change of unemployment being associated with negative and significant effects at the 1 per cent level on life satisfaction. Inflation hurts the unemployed; the coefficient on the level of inflation is positive and significant at the 1% level in all specifications. According to these regressions, the unemployed worry slightly more about the unemployment rate than the inflation rate. There are significant effects of income per capita in regression (6) and (8), which both test the explanatory power of the misery index. The level of misery is significant at the 1 per cent level in both these specifications.

Regressions (9) to (12) in Table XI present life satisfaction regressions for the employed. For the simplest specification in regression (9), both the unemployment and inflation rates are associated with lower life satisfaction, whereas benefits have a positive effect. In regression (10) the misery index has a negative effect on satisfaction, significant at the 1 per cent level. The more general specification of regression (11) shows that both the level and rate of change in inflation are negatively associated with life satisfaction, at the 10 per cent and 1 per cent levels of significance, respectively. Compared to Table X, the effect of higher levels of unemployment as a negative influence on life satisfaction loses its significance. In regression (12) of Table XI, higher levels of the misery index are associated with decreased satisfaction, significant at the 6 per cent level. However, the impact of the misery index on

¹³ It may be useful to stress again that the analysis is not based on data asking people whether they dislike inflation and unemployment. Our analysis complements the survey approach of, for example, Shiller (1996).

¹⁴ By taking the difference between the residuals for the employed and the unemployed we can obtain an estimate of the life satisfaction "gap". We are consequently able to evaluate the claim that generous benefits have narrowed the gap between the well-being of the employed and the unemployed in Europe, leading to reduced work incentives and higher rates of unemployment. If anything, we find there is a slight *upward* trend in the gap. Furthermore, using regression evidence to estimate the determinants of the life satisfaction gap (controlling for country and year fixed effects) leads us to reject the hypothesis that higher unemployment benefits have narrowed the gap in Europe.

the life satisfaction of the employed is less than its impact on the life satisfaction of the unemployed (see Table X). There are also significant effects, in the expected direction, from income per capita.¹⁵

2. *Two Sub-Periods*

We estimated panel regressions for the sub-sample, 1975 to 1983, and the sub-sample 1984 to 1991. In both cases, the misery index had a statistically significant and negative effect on life satisfaction, at the 2 per cent level. Benefits was significantly and positively associated with life satisfaction across both sub-samples. Income per capita had positive effects, significant at the 1 per cent level in the 1984 to 1991 subperiod. Further details are available on request.

3. *Inflation, Unemployment and (Un)happiness in the United States*

Since there is no question on life satisfaction in the United States General Social Survey [1972-1994], it was not able to be included in the panel regressions. However, there are GSS happiness data.

We estimated an OLS happiness regression - not reported - on personal characteristics for the U.S. and obtain the mean residuals for each year. The year-to-year changes in the "(un)happiness residuals" (where higher values indicate greater unhappiness) were positively correlated with the corresponding year-to-year changes in the misery index. These yearly changes in unhappiness were more strongly associated with changes in the unemployment rate than inflation. Figure 2 plots the change in the residuals versus the change in unemployment, for the U.S. from 1972 to 1994, as an illustration of the analysis. Further details are available on request.

4. *Suicides and (Un)happiness*

Provided suicides represent choices in response to (un)happiness, then it is possible to provide a validation check on the self-reported happiness data used in the present paper. If the replies to happiness survey questions genuinely reflect individuals' well-being, such data may be expected to be correlated with the suicide rate.

To test this proposition, suicide rates were regressed on country-by-year reported life satisfaction, using the same panel of countries used in regressions (1) to (12). We controlled for year dummies and country fixed effects, and corrected for heteroscedasticity using White's method. The regression evidence showed that lower levels of reported well-being are associated with higher suicide rates, statistically significant at the 6 per cent level. Further details are again available on request.

V. Conclusion

We study happiness data on 26,668 individuals in the U.S., and happiness and life satisfaction data on 270,105 people in twelve European countries. There are two stages to the empirical work. First, microeconomic equations are estimated. Second, using information from these, a panel analysis of nations is done. The following are the main conclusions of the paper.

1. There is evidence to support the macroeconomics literature's assumption that social well-being is a

¹⁵ We also studied the impact of income inequality on happiness and life satisfaction. The data are insufficient for a proper test, but we found a little evidence that inequality is positively correlated with social unhappiness.

decreasing function of inflation and unemployment. The data are reasonably well-approximated by a simple linear misery function, $W=W(+U)$.¹⁶ Our estimates cover two decades, and control for personal characteristics¹⁷, year dummies, and country fixed-effects.

2. There is a common structure of well-being across countries. The same personal characteristics can be expected to appear significant in a well-being regression, regardless of the country where it is estimated. Furthermore, the coefficients can be expected to be quite similar across nations. We find evidence that being unemployed is associated with lower well-being, that persons in higher income quartiles are happier, and that well-being is U-shaped in age. In general, males, widows, separated individuals, those divorced, those not married, those with children, and those with little education, have lower levels of well-being.

3. Well-being regressions provide an estimate, for each year and country, of the level of well-being that is not associated with personal characteristics. A plot of these happiness and life satisfaction residuals over time is indicative of the presence of happiness cycles, as first suggested by Blanchflower et al (1993) for the U.S.. We find these cycles are determined in part by macroeconomic forces.

4. In a panel that controls for year and country fixed-effects, higher levels of income per capita are found to be associated with increased life satisfaction. The coefficient, however, is small. Higher unemployment benefits also increase life satisfaction. The regression results indicate that people find inflation costly and are willing to undergo a recession to get rid of price increases. In 1985 US dollars, an inflation rate 1 percentage point higher would have to be compensated by approximately \$150 in extra income per capita. Putting it differently, 1 percentage point of inflation corresponds to a well-being cost of approximately 2 per cent of the level of income per capita.

¹⁶ There is some evidence that unemployment is weighted slightly more heavily, and that the unemployed worry more about unemployment and inflation than the employed.

¹⁷ Because individual unemployment is one of the controls in the first-stage regressions, the U in the estimated $W(? , U)$ function measures how the average member of society becomes less happy as unemployment grows. Including the direct effects of unemployment (on those affected) would obviously raise the estimated social loss from unemployment.

Table I: Happiness in the United States: 1972-94

Reported Happiness			Marital Status:	
	All	Unemployed	Married	Divorced
Very happy	32.66	17.75	39.54	19.70
Pretty happy	55.79	52.66	52.51	61.75
Not too happy	11.55	29.59	7.95	18.55

Reported Happiness	Sex:		Income Quartiles:			
	Male	Female	1 st (Lowest)	2nd	3rd	4th (Highest)
Very happy	31.95	33.29	24.07	29.46	34.80	40.78
Pretty happy	56.33	55.31	56.04	58.02	56.22	53.14
Not too happy	11.72	11.39	19.88	12.52	8.98	6.08

Note: Based on 26,668 observations. All numbers are expressed as a percentages.

Table II: Happiness in Europe: 1975-86

Reported Happiness			Marital Status:	
	All	Unemployed	Married	Divorced
Very happy	23.42	15.88	26.16	12.46
Pretty happy	57.95	51.11	57.94	54.93
Not too happy	18.64	33.01	15.91	32.61

Reported Happiness	Sex:		Income Quartiles:			
	Male	Female	1 st (Lowest)	2nd	3rd	4th (Highest)
Very happy	22.11	24.67	18.83	21.41	24.91	28.40
Pretty happy	59.75	56.21	54.50	58.49	60.11	58.49
Not too happy	18.14	19.12	26.67	20.10	14.98	13.11

Note: Based on 108,802 observations. All numbers are expressed as a percentages.

Table III: Happiness in the United States (Ordered Probit): 1972-94*Number of Observations=26,668*

Dep Var: Reported Happiness	Coefficient	Standard Error
Unemployed	-0.379	0.041
Self Employed	0.074	0.023
Male	-0.125	0.016
Age	-0.021	0.003
Age Squared	2.77e-4	3.00e-5
Education: High School	0.091	0.019
Associate/Junior College	0.123	0.040
Bachelor's	0.172	0.027
Graduate	0.188	0.035
Marital Status: Married	0.380	0.026
Divorced	-0.085	0.032
Separated	-0.241	0.046
Widowed	-0.191	0.037
No. of children: 1	-0.112	0.025
2	-0.074	0.024
3 or more	-0.119	0.024
Income Quartiles: Second	0.161	0.022
Third	0.279	0.023
Fourth (highest)	0.398	0.025
Retired	0.036	0.031
School	0.176	0.055
At home	0.005	0.023
Other	-0.227	0.067
cut 1	-1.217	0.077
cut 2	0.528	0.077

Note: Log-likelihood=-23941.869. $\text{Chi}^2(50)=2269.64$. The regression includes region and year dummies from 1972 to 1994.

Table IV: Happiness in Europe (Ordered Probit): 1975-86*Number of Observations=108,802*

Dep Var: Reported Happiness	Coefficient	Standard Error
Unemployed	-0.364	0.017
Self employed	0.040	0.013
Male	-0.072	0.009
Age	-0.031	0.001
Age Squared	3.33e-4	1.5e-5
Education to age: 15-18 years	0.024	0.009
≥ 19 years	0.072	0.011
Marital Status: Married	0.228	0.011
Divorced	-0.306	0.026
Separated	-0.405	0.038
Widowed	-0.208	0.018
No. of children ≥8 & ≤15 yrs: 1	-0.030	0.010
2	-0.035	0.013
3	-0.123	0.021
Income Quartiles: Second	0.129	0.011
Third	0.261	0.011
Fourth (highest)	0.379	0.012
Retired	0.062	0.015
School	-0.021	0.019
At home	0.061	0.011
Countries: France	-0.542	0.016
Belgium	0.012	0.016
Netherlands	0.303	0.016
Germany	-0.399	0.016
Italy	-0.907	0.016
Luxembourg	-0.156	0.023
Denmark	0.090	0.017
Britain	-0.188	0.017
Northern Ireland	-0.106	0.024
Greece	-1.006	0.020
Spain	-0.406	0.029
Portugal	-0.716	0.028
cut 1	-1.628	0.034
cut 2	0.168	0.034

Note: Log-likelihood=-96707.453. $\chi^2(41)=17494.6$. The regression includes year dummies from 1975 to 1986.

Table V: Life Satisfaction in Europe: 1975-91

Reported Life Satisfaction			Marital Status:	
	All	Unemployed	Married	Divorced
Very satisfied	26.31	16.19	28.59	18.26
Fairly satisfied	54.57	45.53	54.61	52.78
Not very satisfied	14.21	24.97	12.64	20.60
Not at all satisfied	4.90	13.31	4.17	8.36

Reported Life Satisfaction	Sex:		Income Quartiles:			
	Male	Female	1 st (Lowest)	2nd	3rd	4th (Highest)
Very satisfied	25.48	27.80	17.29	22.51	27.20	32.40
Fairly satisfied	55.13	53.57	49.14	54.63	56.29	55.39
Not very satisfied	14.26	14.13	22.65	17.02	12.77	9.65
Not at all satisfied	5.13	4.50	10.91	5.84	3.74	2.56

Note: Based on 149,274 observations of individuals in the labour force. All numbers are expressed as a percentages.

Table VI: Europe's Life Satisfaction (Ordered Probit): 1975-91*Number of observations=149,274*

Dep Var: Reported Life Satisfaction	Coefficient	Standard Error
Unemployed	-0.483 ***	0.011
Self employed	0.055	0.008
Male	-0.093	0.006
Age	-0.031	0.001
Age Squared	3.61e-4	1.73e-5
Education to age: 15-18 years	0.034	0.008
≥ 19 years	0.088	0.009
Marital Status: Married	0.131	0.008
Divorced	-0.248	0.018
Separated	-0.302	0.027
Widowed	-0.109	0.021
No. of children ≥ 8 & ≤ 15 yrs: 1	-0.031	0.008
2	-0.045	0.010
3	-0.101	0.015
Income Quartiles: Second	0.170	0.010
Third	0.301	0.010
Fourth (highest)	0.455	0.010
Countries: France	-0.615	0.014
Belgium	-0.042	0.014
Netherlands	0.319	0.015
Germany	-0.186	0.014
Italy	-0.655	0.014
Luxembourg	0.179	0.021
Denmark	0.647	0.014
Britain	-0.050	0.014
Northern Ireland	0.019	0.021
Greece	-0.737	0.016
Spain	-0.358	0.019
Portugal	-0.792	0.018
cut 1	-2.300	0.033
cut 2	-1.418	0.032
cut 3	0.293	0.032

Notes: Log-likelihood=-150220.39. $\chi^2(45)=30033.9$. The regression includes year dummies from 1975 to 1991. The sample consists of European employed and unemployed workers.

Table VII: Life Satisfaction in European Nations (Ordered Probit): 1975-91

Dep Var: Reported Life Satisfaction	U.K.	France	Germany	Italy
Unemployed	-0.591 (0.035)	-0.258 (0.028)	-0.421 (0.036)	-0.538 (0.033)
Self employed	0.034 (0.029)	0.122 (0.026)	0.023 (0.029)	0.065 (0.021)
Male	-0.104 (0.017)	-0.060 (0.015)	-0.029 (0.016)	0.012 (0.016)
Age	-0.027 (0.003)	-0.026 (0.003)	-0.008 (0.003)	-0.032 (0.003)
Age Squared	3.30e-4 (2.90e-5)	3.00e-4 (2.95e-5)	1.20e-4 (2.87e-5)	3.20e-4 (2.91e-5)
Education to age: 15-18 years	0.035 (0.021)	0.117 (0.018)	0.001 (0.018)	0.044 (0.019)
≥ 19 years	0.116 (0.028)	0.243 (0.021)	0.110 (0.023)	0.055 (0.020)
Marital Status: Married	0.153 (0.023)	0.043 (0.022)	0.154 (0.023)	0.210 (0.021)
Divorced	-0.281 (0.042)	-0.179 (0.043)	-0.330 (0.037)	-0.235(0.086)
Separated	-0.347 (0.063)	-0.241 (0.069)	-0.408 (0.076)	-0.250 (0.065)
Widowed	-0.114 (0.034)	-0.175 (0.036)	-0.078 (0.033)	-0.069 (0.033)
No. of children ≥ 8 & ≤ 15 yrs: 1	-0.101 (0.022)	-0.079 (0.019)	-0.014 (0.021)	-4.27e-4 (0.018)
2	-0.128 (0.024)	-0.075 (0.023)	-0.027 (0.028)	-0.004 (0.025)
3	-0.199 (0.037)	-0.169 (0.033)	-0.046 (0.049)	-0.071 (0.048)
Income Quartiles: Second	0.225 (0.023)	0.213 (0.020)	0.186 (0.020)	0.184 (0.019)
Third	0.368 (0.024)	0.371 (0.021)	0.319 (0.021)	0.297 (0.020)
Fourth (highest)	0.561 (0.026)	0.580 (0.023)	0.452 (0.022)	0.392 (0.021)
Retired	0.113 (0.027)	0.351 (0.030)	0.079 (0.027)	0.057 (0.027)
School	0.051 (0.046)	0.245 (0.034)	0.027 (0.033)	0.031 (0.031)
At home	-3.51e-4 (0.022)	0.149 (0.022)	0.024 (0.022)	0.010 (0.022)
Obs.	25565	28841	28151	29263
cut 1	-1.853 (0.071)	-1.636 (0.069)	-1.944 (0.071)	-1.493 (0.066)
cut 2	-1.087 (0.070)	-0.715 (0.069)	-0.850 (0.069)	-0.511 (0.066)
cut 3	0.556 (0.070)	1.136 (0.069)	1.086 (0.070)	1.206 (0.066)
Log-likelihood	-25967.5	-29618.5	-25881.1	-31871.9

Note: The regressions include region dummies, and year dummies from 1975 to 1991.

Table VIII: Summary Statistics for the Regression Equations

Variable	Obs	Mean	Std. Dev.	Min.	Max.
LIFE SATISFACTION	150	-0.010	0.078	-0.238	0.195
LIFE SATISFACTION - EMPLOYED	150	-0.011	0.086	-0.257	0.198
LIFE SATISFACTION - UNEMPLOYED	149	0.001	0.158	-0.447	0.608
UNEMPLOYMENT RATE	150	0.087	0.037	0.032	0.211
GDP PER CAPITA	150	7605.993	2402.222	2145	12184
INFLATION RATE	150	0.086	0.059	-0.007	0.245
BENEFITS	150	0.303	0.158	0.004	0.562

Table IX: Second-Stage Life Satisfaction Regressions for a Panel of 11 European Countries for 1975-91 using OLS Residuals from the First Stage Regression

Dependent Variable: Residual Life Satisfaction	(1)	(2)	(3)	(4)
LIFE SATISFACTION (t-1)			0.512** (0.067)	0.516** (0.065)
UNEMPLOYMENT RATE	-1.629** (0.531)		-0.793* (0.479)	
INFLATION RATE	-1.116** (0.344)		-0.726** (0.351)	
GDP PER CAPITA	3.9e-5 (3.1e-5)	5.4e-5** (2.7e-5)	4.8e-5* (2.6e-5)	4.8e-5** (2.2e-5)
BENEFITS	0.590** (0.155)	0.615** (0.151)	0.236 (0.155)	0.244 (0.155)
MISERY		-1.194** (0.323)		-0.756** (0.343)
ΔUNEMPLOYMENT RATE			0.074 (0.874)	
ΔINFLATION RATE			-0.959** (0.375)	
ΔGDP PER CAPITA			1.0e-4* (5.6e-5)	6.4e-5 (4.6e-5)
ΔBENEFITS			0.821 (0.538)	0.837 (0.553)
ΔMISERY				-0.850** (0.370)
Personal Controls	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj R ²	0.16	0.16	0.44	0.45
Observations	150	150	139	139

Notes: [1] Standard errors in parentheses are White-corrected. * denotes significance at the 10% level. ** denotes significance at the 5% level. [2] Three year moving averages of the explanatory variables are used. The coefficients (standard errors) when using current levels in regression (1) of the unemployment rate, inflation rate, gdp per capita and benefits are: -1.035 (0.491), -0.589 (0.288), 0.046 (0.028) and 0.636 (0.161), respectively.

Table X: Second-Stage Life Satisfaction Regressions for a Panel of 11 European Countries for 1975-91 using OLS Residuals from the First Stage Regression

Dependent Variable: Residual Life Satisfaction - Unemployed	(5)	(6)	(7)	(8)
LIFE SATISFACTION-UNEMPLOYED(t-1)			0.041 (0.079)	0.067 (0.078)
UNEMPLOYMENT RATE	-2.598** (0.967)		-3.655** (1.020)	
INFLATION RATE	-1.781** (0.666)		-3.164** (0.757)	
GDP PER CAPITA	7.1e-5 (5.3e-5)	9.5e-5** (4.5e-5)	8.1e-5 (6.2e-5)	9.3e-5 [*] (5.6e-5)
BENEFITS	0.722 [*] (0.414)	0.759** (0.413)	1.339** (0.460)	1.260** (0.488)
MISERY		-1.903** (0.628)		-2.889** (0.764)
ΔUNEMPLOYMENT RATE			-5.921** (1.542)	
ΔINFLATION RATE			-0.909 (0.862)	
ΔGDP PER CAPITA			-1.6e-4 (1.3e-4)	7.6e-7 (1.2e-4)
ΔBENEFITS			2.706** (1.168)	2.401 [*] (1.244)
ΔMISERY				-1.583** (0.894)
Personal Controls	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj R ²	0.17	0.17	0.28	0.25
Observations	135	135	125	125

Notes: [1] Standard errors in parentheses are White-corrected. ^{*} denotes significance at the 10% level. ^{**} denotes significance at the 5% level. [2] Three year moving averages of the explanatory variables are used. The coefficients (standard errors) when using current levels in regression (5) of the unemployment rate, inflation rate, gdp per capita and benefits are: -1.681 (0.837), -1.039 (0.534), 0.079 (0.049) and 0.878 (0.395), respectively. [3] Cell sizes are restricted to at least 25 observations.

Table XI: Second-Stage Life Satisfaction Regressions for a Panel of 11 European Countries for 1975-91 using OLS Residuals from the First Stage Regression

Dependent Variable: Residual Life Satisfaction - Employed	(9)	(10)	(11)	(12)
LIFE SATISFACTION - EMPLOYED (t-1)			0.501** (0.058)	0.501** (0.058)
UNEMPLOYMENT RATE	-1.252** (0.591)		-0.446 (0.552)	
INFLATION RATE	-1.137** (0.390)		-0.702* (0.390)	
GDP PER CAPITA	3.5e-5 (3.9e-5)	3.9e-5 (3.4e-5)	5.8e-5** (3.0e-5)	4.8e-5** (2.7e-5)
BENEFITS	0.778** (0.183)	0.784** (0.179)	0.317 (0.204)	0.314 (0.207)
MISERY		-1.154** (0.364)		-0.706* (0.378)
ΔUNEMPLOYMENT RATE			0.481 (1.000)	
ΔINFLATION RATE			-1.052** (0.403)	
ΔGDP PER CAPITA			1.1e-4* (6.2e-5)	1.1e-4* (6.2e-5)
ΔBENEFITS			0.414 (0.676)	0.414 (0.676)
ΔMISERY				0.414 (0.676)
Personal Controls	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj R ²	0.11	0.11	0.40	0.40
Observations	150	150	139	139

Notes: [1] Standard errors in parentheses are White-corrected. * denotes significance at the 10% level. ** denotes significance at the 5% level. [2] Three year moving averages of the explanatory variables are used. The coefficients (standard errors) when using current levels in regression (9) of the unemployment rate, inflation rate, gdp per capita and benefits are: -0.741 (0.546), -0.712 (0.314), 0.046 (0.035) and 0.820 (0.188), respectively.

Appendix I

The United States General Social Survey [1972-1994]

The General Social Surveys have been conducted by the National Research Center at the University of Chicago since 1972. The items appearing on the surveys are of three types: Permanent questions that occur on each survey, rotating questions that appear on two out of every three surveys (for example, 1973, 1974 and 1976, or 1973, 1975 and 1976), and a few occasional questions such as split ballot experiments that occur in a single survey.

Interviews have been undertaken during February, March and April of 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1980, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1993 and 1994. There were no surveys conducted in 1979, 1981 and 1992. There were a total of 32,380 completed interviews (1613 in 1972, 1504 in 1973, 1484 in 1974, 1490 in 1975, 1499 in 1976, 1530 in 1977, 1532 in 1978, 1468 in 1980, 1506 in 1982, 354 in 1982 black oversample, 1599 in 1983, 1473 in 1984, 1534 in 1985, 1470 in 1986, 1466 in 1987, 353 in 1987 black oversample, 1481 in 1988, 1537 in 1989, 1372 in 1990, 1517 in 1991, 1606 in 1993 and 2992 in 1994).

The Euro-Barometer Survey Series [1975-1991]

The Euro-Barometer Surveys used in this paper were conducted by various research firms operated within the European Community (E.C.) countries under the direction of the European Commission. Either a nationwide multi-stage probability sample or a nationwide stratified quota sample of persons aged 15 and over was selected in each of the E.C. countries. The cumulative data file used contains 36 attitudinal, 21 demographic and 10 analysis variables selected from the European Communities Studies, 1970-1973, and Euro-Barometers, 3-38.

Data for Belgium, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Northern Ireland, and the United Kingdom were available for the full sample period which we used (1975-1991) whereas data was only available from 1981 to 1991 for Greece and from 1985 to 1991 for both Spain and Portugal. The number of observations in our sample was 37657 for France, 36972 for Belgium, 37141 for The Netherlands, 37349 for Germany, 38712 for Italy, 11488 for Luxembourg, 36453 for Denmark, 36247 for Ireland, 37732 for Britain, 11072 for Northern Ireland, 25226 for Greece, 15067 for Spain and 15000 for Portugal.

Appendix II

Definition and Summary of Variables:

REPORTED HAPPINESS: This is a discrete variable which takes on three values. For the U.S. General Social Survey [1972-1994], the variable is generated from the question which asks: "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?". The three relevant response categories are: Very happy, Pretty happy and Not too happy (The Don't know and No answer categories are not included in our data set). For the Euro-Barometer Survey Series [1975-1991], the variable is generated from the question which asks: "Taking all things together, how would you say things are these days--would you say you're very happy, fairly happy, or not too happy these days?". The three relevant response categories are: Very

happy, Fairly happy and Not too happy (The Don't know and No answer categories are not included in our data set).

REPORTED LIFE SATISFACTION: This is a discrete variable which takes on four values and is generated from the Euro-Barometer Survey Series [1975-1991] question which asks: "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?". The four relevant response categories are: Very satisfied, Fairly satisfied, Not very satisfied and Not at all satisfied (The Don't know and No answer categories are not included in our data set).

UNEMPLOYED: A dummy taking the value 1 if respondent is unemployed and 0 otherwise.

SELF EMPLOYED: A dummy taking the value 1 if respondent is self-employed and 0 otherwise.

MALE: A dummy taking the value 1 if respondent is male and 0 otherwise.

AGE: The respondent's age in years.

AGE SQUARED: The square of the respondent's age in years.

EDUCATION TO AGE: For European countries, this heading refers to a set of dummy variables which take the value 1 depending on the age at which the respondent finished full-time education: up to 14 years, 15-18 years or 19 years. The base category is up to 14 years.

EDUCATION: For the U.S. this heading refers to a set of dummy variables which take the value 1 depending on the respondent's level of educational attainment: less than high school, high school, associate/junior college, bachelor's or graduate. The base category is less than high school.

MARITAL STATUS: A set of dummy variables taking the value 1 depending on the respondent's marital status: married, divorced, separated, widowed or never married. The base category is never married.

NUMBER OF CHILDREN: A set of dummy variables taking the value 1 depending on how many children the respondent has. For the U.S., this variable is generated from the General Social Survey question which asks: How many children have you ever had? Please count all that were born alive at any time (including any you had from a previous marriage). The base category is no children.

NUMBER OF CHILDREN ≥ 8 & ≤ 15 YEARS: For the Euro-Barometer Survey, this set of dummy variables takes on the value 1 depending on the number of children living at home between 8 and 15 years. The base category is none.

INCOME QUANTILES: This heading refers to a set of 4 dummy variables which take the value 1 depending on which income quartile the respondent's earnings lie. The base category is the lowest income quartile.

RETIRED: A dummy taking the value 1 if respondent is retired and 0 otherwise.

SCHOOL: A dummy taking the value 1 if respondent is at school and 0 otherwise.

AT HOME: A dummy taking the value 1 if respondent is keeping house (not employed) and 0

otherwise.

OTHER: A dummy taking the value 1 if the respondent does not fall into any of the categories: employed, unemployed, retired, at school or keeping house, and 0 otherwise.

REGIONS: This heading refers to a set of dummy variables which take the value 1 depending on whether the respondent lives in the corresponding region. For the U.S., the regions are Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain and Pacific. The base region is New England. Britain, France and Germany are similarly divided into a set of regions which are listed in their regression equations.

COUNTRIES: The dummy variables under this heading for the European happiness and life satisfaction regressions (see Tables IV and VI) which include France, Belgium, The Netherlands, Germany, Italy, Luxembourg, Denmark, Britain, Northern Ireland, Greece, Spain and Portugal, take on the value 1 if the respondent lived in France, Belgium, The Netherlands, Germany, Italy, Luxembourg, Denmark, Britain, Northern Ireland, Greece, Spain and Portugal, respectively. The base category is Ireland.

YEAR DUMMIES: The dummy variables under this heading, which include 1972, 1973, 1974, ..., and 1994, take on the value 1 if the respondent is surveyed in 1972, 1973, 1974, ... or 1994, respectively. The base year is 1986 for all the regressions.

LIFE SATISFACTION: The average of the residuals from a Life Satisfaction Ordinary Least Squares regression on personal characteristics. The residuals are averaged for each country, i , and year, t , in the sample to give $LIFE\ SATISFACTION_{it}$ (Mean=-0.010; Standard deviation=0.078).

LIFE SATISFACTION - EMPLOYED: The average of the residuals for the employed for each country and year from a Life Satisfaction Ordinary Least Squares regression on personal characteristics (Mean=-0.011; Standard deviation=0.086).

LIFE SATISFACTION - UNEMPLOYED: The average of the residuals for the unemployed for each country and year from a Life Satisfaction Ordinary Least Squares regression on personal characteristics (Mean=0.001; Standard deviation=0.158).

BENEFITS: The OECD index of (pre-tax) replacement rates (unemployment benefit entitlements divided by the corresponding wage, using a three year moving average). In calculating this summary measure, the situation of a representative or average individual is estimated. Consequently, the unweighted mean of 18 numbers based on the following scenarios is determined:

-three unemployment durations (for persons with a long record of previous employment); the first year, the second and third years, and the fourth and fifth years of employment.

-three family and income situations: a single person, a married person with a dependent spouse, and a married person with a spouse in work; and

-two different levels of previous earnings: average earnings and two-thirds of average earnings (For further details see the OECD Jobs Study [1994]).

Since this index was calculated only for odd-numbered years, the value of BENEFITS for even-numbered years was a linear interpolation (Mean=0.303; Standard deviation=0.158).

UNEMPLOYMENT RATE: The unemployment rate (three year moving average) from the OECD Economic Outlook [1995] (Mean=0.087; Standard deviation=0.037).

INFLATION RATE: The inflation rate (three year moving average), as measured by the rate of change in consumer prices, from IMF World Tables [1994] (Mean=0.086; Standard deviation=0.059).

GDP PER CAPITA: Real GDP per capita (three year moving average) at the price levels and exchange rates of 1985 (U.S. dollars-measured in thousands), from OECD World Statistics [1993] (Mean=7606; Standard deviation=2402).

ΔVR : For the corresponding variable, VR (measured as a three year moving average), VR measures the average change over the three year period.

Appendix III

Table A.I: The U.S. General Social Surveys, 1972-94. Means and Standard Deviations for the U.S. Happiness Regression

	Mean	Standard Deviation
<u>Dependent Variable:</u>		
Happiness	2.2111	0.6305
<u>Independent Variables:</u>		
Unemployed	0.0317	0.1752
Self Employed	0.1122	0.3156
Male	0.4712	0.4992
Age	44.6640	16.8985
Age Squared	2280.424	1674.343
Education: High School	0.5228	0.4995
Associate/Junior College	0.0402	0.1963
Bachelor's	0.1288	0.3350
Graduate	0.0578	0.2333
Marital Status: Married	0.6117	0.4874
Divorced	0.1039	0.3051
Separated	0.0327	0.1779
Widowed	0.0900	0.2862
No. of children: 1	0.1581	0.3648
2	0.2444	0.4297
3 or more	0.3293	0.4700
Income Quartiles: Second	0.2404	0.4274
Third	0.2659	0.4418
Fourth (highest)	0.2657	0.4417
Retired	0.1186	0.3233
School	0.0177	0.1317
At home	0.1636	0.3700
Other	0.0114	0.1063
* Based on 26,668 observations.		

Table A.II: The Eurobarometer Surveys, 1975-86. Means and Standard Deviations for the European Happiness Regression

	Mean	Standard Deviation
<u>Dependent Variable:</u>		
Unhappiness	2.048	0.6467
<u>Independent Variables:</u>		
Unemployed	0.0527	0.2235
Self employed	0.0958	0.2943
Male	0.4909	0.4999
Age	43.5090	17.5258
Age Squared	2200.189	1654.495
Education to age: 15-18 years	0.4059	0.4911
≥ 19 years	0.2266	0.4186
Marital Status: Married	0.6841	0.4649
Divorced	0.0216	0.1454
Separated	0.0092	0.0953
Widowed	0.0843	0.2778
No. of children ≥ 8 & ≤ 15 yrs: 1	0.1510	0.3580
2	0.0841	0.2775
3	0.0308	0.1728
Income Quartiles: Second	0.2507	0.4334
Third	0.2617	0.4396
Fourth (highest)	0.2454	0.4303
Retired	0.1594	0.3661
School	0.0615	0.2403
At home	0.2260	0.4183
* Based on 108,802 observations.		

Table A.III: The Eurobarometer Surveys, 1975-91. Means and Standard Deviations for the European Life Satisfaction Regression.

	Mean	Standard Deviation
<u>Dependent Variable:</u>		
Reported Life Satisfaction	3.0227	0.7751
<u>Independent Variables:</u>		
Unemployed	0.0932	0.2907
Self employed	0.1774	0.3820
Male	0.6410	0.4797
Age	38.1206	12.8812
Age Squared	1619.106	1072.517
Education to age: 15-18 years	0.4400	0.4964
≥ 19 years	0.3107	0.4628
Marital Status: Married	0.6913	0.4620
Divorced	0.0323	0.1768
Separated	0.0122	0.1096
Widowed	0.0230	0.1500
No. of children ≥ 8 & ≤ 15 yrs: 1	0.1788	0.3831
2	0.1161	0.3204
3	0.0429	0.2027
Income Quartiles: Second	0.2400	0.4271
Third	0.2943	0.4557
Fourth (highest)	0.3213	0.4670
* Based on 149,274 observations.		

Appendix IV:

Table A.IV: Life Satisfaction in European Nations (Ordered Probit): 1975-91

Dep Var: Reported Life Satisfaction	Belgium	Nether.	Denmark	Luxem.
Unemployed	-0.354 (0.030)	-0.532 (0.032)	-0.444 (0.035)	-0.915 (0.135)
Self employed	-4.07e-4 (0.028)	0.052 (0.033)	0.012 (0.030)	0.015 (0.052)
Male	-0.045 (0.017)	-0.187 (0.019)	-0.133 (0.016)	-0.083 (0.034)
Age	-0.023 (0.003)	-0.041 (0.003)	-0.029 (0.003)	-0.028 (0.005)
Age Squared	2.39e-4 (2.91e-5)	4.46e-4 (3.22e-5)	3.45e-4 (3.07e-5)	3.62e-4 (5.90e-5)
Education to age: 15-18 years	0.045 (0.019)	0.071 (0.020)	0.059 (0.021)	0.016 (0.039)
≥ 19 years	0.092 (0.023)	0.064 (0.023)	0.091 (0.023)	0.050 (0.047)
Marital Status: Married	0.085 (0.024)	0.169 (0.024)	0.147 (0.023)	0.161 (0.042)
Divorced	-0.340 (0.047)	-0.404 (0.044)	-0.186 (0.040)	-0.190 (0.086)
Separated	-0.286 (0.053)	-0.670 (0.113)	-0.249 (0.079)	-0.312 (0.125)
Widowed	-0.233 (0.036)	-0.266 (0.039)	-0.120 (0.036)	-0.188 (0.066)
No. of children ≥8 & ≤15 yrs: 1	-0.043 (0.021)	-0.026 (0.022)	-0.042 (0.022)	0.040 (0.038)
2	-0.020 (0.027)	-0.041 (0.023)	-0.034 (0.027)	-0.058 (0.051)
3	0.004 (0.041)	-0.080 (0.038)	-0.123 (0.050)	0.036 (0.087)
Income Quartiles: Second	0.131 (0.022)	0.124 (0.021)	0.097 (0.024)	0.236 (0.038)
Third	0.262 (0.024)	0.281 (0.022)	0.260 (0.027)	0.395 (0.040)
Fourth (highest)	0.370 (0.026)	0.459 (0.023)	0.433 (0.028)	0.452 (0.041)
Retired	0.051 (0.030)	0.101 (0.032)	-0.084 (0.032)	7.84e-5 (0.053)
School	0.003 (0.037)	-0.011 (0.035)	0.039 (0.033)	0.034 (0.068)
At home	0.073 (0.024)	0.015 (0.023)	0.009 (0.034)	0.071 (0.044)
Obs.	25304	28118	26738	8051
cut 1	-2.350 (0.084)	-2.802 (0.080)	-2.686 (0.078)	-2.073 (0.135)
cut 2	-1.511 (0.083)	-1.972 (0.078)	-1.870 (0.074)	-1.227 (0.131)
cut 3	0.190 (0.082)	-0.199 (0.077)	-0.259 (0.073)	0.504 (0.131)
Log-likelihood	-25233.1	-24878.6	-22178.6	-7459.5

Note: The regressions include region dummies, and year dummies from 1975 to 1991.

Table A.V: Life Satisfaction in European Nations (Ordered Probit): 1975-91

Dep Var: Reported Life Satisfaction	Ireland	Spain	Portugal	Greece
Unemployed	-0.607 (0.032)	-0.406 (0.047)	-0.502 (0.062)	-0.280 (0.049)
Self employed	0.094 (0.026)	0.081 (0.039)	0.128 (0.034)	0.027 (0.023)
Male	-0.164 (0.023)	0.012 (0.028)	-0.040 (0.024)	-0.007 (0.020)
Age	-0.024 (0.003)	-0.037 (0.004)	-0.034 (0.004)	-0.026 (0.003)
Age Squared	3.37e-4 (3.52e-5)	3.80e-4 (4.00e-5)	3.47e-4 (4.22e-4)	2.79e-4 (3.24e-5)
Education to age: 15-18 years	0.126 (0.020)	-0.024 (0.031)	0.055 (0.032)	0.105 (0.021)
≥ 19 years	0.204 (0.030)	0.021 (0.032)	-0.002 (0.032)	0.155 (0.024)
Marital Status: Married	0.114 (0.023)	0.114 (0.034)	-0.008 (0.034)	0.169 (0.027)
Divorced	-0.072 (0.257)	-0.055 (0.150)	-0.246 (0.092)	-0.183 (0.073)
Separated	-0.535 (0.079)	-0.075 (0.100)	-0.334 (0.116)	-0.374 (0.147)
Widowed	-0.142 (0.038)	-0.157 (0.051)	-0.222 (0.052)	-0.126 (0.043)
No. child. ≥8 & ≤15 yrs: 1	-0.051 (0.025)	0.003 (0.030)	-0.037 (0.027)	-2.63e-4 (0.022)
2	-0.070 (0.026)	-0.014 (0.036)	-0.052 (0.036)	-0.001 (0.026)
3	-0.104 (0.025)	-0.053 (0.055)	-0.157 (0.059)	0.080 (0.053)
Income Quartiles: Second	0.129 (0.024)	0.132 (0.032)	0.126 (0.033)	0.197 (0.022)
Third	0.248 (0.025)	0.244 (0.033)	0.213 (0.034)	0.318 (0.024)
Fourth (highest)	0.485 (0.027)	0.355 (0.036)	0.414 (0.036)	0.490 (0.025)
Retired	0.089 (0.039)	0.153 (0.043)	0.007 (0.043)	0.092 (0.033)
School	0.012 (0.050)	0.022 (0.049)	0.116 (0.051)	0.089 (0.039)
At home	-0.045 (0.028)	0.082 (0.037)	-0.021 (0.035)	0.130 (0.027)
Obs.	20075	10973	12497	20003
cut 1	-2.103 (0.080)	-2.012 (0.103)	-1.803 (0.096)	-1.108 (0.084)
cut 2	-1.423 (0.079)	-0.963 (0.102)	-0.819 (0.096)	-0.314 (0.084)
cut 3	0.102 (0.078)	0.479 (0.102)	1.316 (0.096)	1.004 (0.084)
Log-likelihood	-21028.9	-12323.6	-12081.6	-24879.2

Note: The regressions include region dummies, and year dummies from 1975 to 1991.

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