RESEARCH PAPER

Analysing trends in subjective well-being in 15 European countries, 1973–2002

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Abstract Previous empirical research has been unable to find a sufficient correlation between subjective well-being and per capita income, being hampered by limited longitudinal information and an inability to account for the predictions of competing theories. We bring new evidence to this question by exploiting a long and complete time-series from the Eurobarometer Survey, 1973–2002 allowing an examination of trends in life satisfaction across 15 European countries employing a modified version of Kendall's Tau. Our results show that while current GDP growth does not affect trends in well-being, accelerations in GDP growth do. In addition, faster GDP growth and faster growth of government consumption than in neighbouring countries induces positive trends in life satisfaction. Our findings are consistent with the predictions of aspirations theory and the theory of reference group comparisons.

Keywords Life satisfaction · Trends · Comparison theory · Aspiration theory · GDP growth

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For aught I see, they are as sick that surfeit with too much as they that starve with nothing.[1]

1 Introduction

Few goals in life are shared by so many as the pursuit of happiness, a pursuit as old as mankind itself. In economics, it is a standard assumption that happiness—individual utility in the economic vocabulary—depends on income/consumption, leisure and sometimes a few other factors. Yet, although mainstream models would predict that higher income leads to greater happiness, most earlier empirical research has been unable to find a sufficiently strong correlation between subjective well-being and per capita income in rich countries to support the standard utility assumption. In fact, many happiness scholars hold the view that a positive association holds only at certain points in time within particular countries and not for the group of high-income countries as a whole (Frey and Stutzer 2002). The usual explanations given for this paradox are either that individuals compare themselves with their peers and neighbours (Duesenberry 1949; Easterlin 1995; McBride 2001) or that as incomes increase, so do individuals' income aspirations (Irwin 1944; Stutzer 2004); both these factors are assumed to be present already at fairly modest levels of per-capita income. Distinguishing between the two theories is nonetheless problematic as they may well be observationally equivalent in most available data: when the incomes of all increase, comparison theory would suggest that individuals do not become more satisfied because their reference group has experienced an equivalent income improvement, yet the same implication can be derived from aspiration theory as aspirations may increase proportionally for individuals and their reference groups, in particular since individuals tend to be fairly similar to those in their reference group. This complication might question whether recent findings are due to one or the other effect.

Another recurring problem with previous studies is that conclusions on the absence of an effect of economic performance on well-being have typically been based on either limited cross-sectional samples which may be contaminated by a strong time-constant cultural component (Kenny 1999) or on sparse and incomplete longitudinal data. For example, Frey and Stutzer (2002) analyse differences in subjective well-being among Swiss cantons only and a number of studies have used British and German household panel data for similar purposes. Ferrer-i-Carbonell (2005) uses the German Socio Economic Panel data for the years 1992–1997 to test a specific hypothesis in the Duesenberry tradition, i.e. that the income for a reference group is important for individual well-being. Among the results is the finding of a small, but significant, impact from own income on individual well-being. Identical relative increases in own income and income for the reference group have, however, no impact on individual well-being, which is higher, the higher is the individual income relative to the income in the reference group. Stutzer (2004) instead focuses on testing Irwin's aspiration theory on data from a similar Swiss household panel, finding substantial evidence of aspiration effects. Alternatively, Helliwell (2003) and others use the World Values Survey (WVS) data (Inglehart et al. 2004) to analyse this question with many more countries. Yet, while the WVS provides ample cross-sectional observations on a large number of countries, only limited longitudinal information is available as the existing four waves are spaced rather far apart in time,

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[1] The quote is from William Shakespeare's The Merchant of Venice, Act 1, Scene 2.

1980–1982, 1990–1991, 1995–1997 and 1999–2001. Heady et al. (2004) instead analyse household panel data for five countries and find the happiness measure to be considerably more affected by economic factors than found in most of the earlier literature. The economic factors in the study include wealth and consumption expenditures and among the findings are that wealth has a stronger impact on happiness than income and that non-durable consumption expenditures are as important for happiness as income. Recent cross-country studies have therefore returned to this issue, questioning the insignificance of economic factors, which lead to a heated debate in *Social Science Indicators* between Richard Easterlin, who defends the standard conclusion that average income does not matter, and Michael Hagerty and Ruud Veenhoven, who on the other side argue for positive happiness trends in most nations caused by income growth (Hagerty and Veenhoven 2003; Easterlin 2005; Veenhoven and Hagerty 2005).

As such, whether or not national economic performance affects the happiness of the nation's citizens remains an unanswered and somewhat controversial question on both a theoretical and an empirical level. This is not a trivial point since the study of happiness has powerful implications for both social psychology and basic economic theory. Theoretically, for example, set-point theory according to which people react to events but invariably return to their equilibrium baseline level of satisfaction, provides a powerful explanation of the insignificance of increases of incomes. On the other hand, standard economic utility theory, with some important additions, matches recent findings suggesting that even transitory events can have permanent effects by in some cases altering individuals' set points (e.g. Lucas et al. 2004; and Heady 2006). From a political point of view, happiness studies therefore also hold substantive implications, as utility theory is one of the basic building blocks of all macroeconomic models used for evaluating the consequences of policies. If this building block is fundamentally wrong, so may the policy implications also be.

In this paper, we therefore revisit the question of the effect of economic performance on life satisfaction by exploiting a long and relatively complete set of time series data, the semi-annual Eurobarometer Survey which has been collected from 1973. This allows us to analyse trends over time in an indicator of subjective well-being and income in 15 European countries: Austria, Belgium, Denmark, Finland, France, (West) Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Missing observations and considerable noise makes standard trends measures infeasible. In order to overcome these problems we use a modified version of Kendall's Tau to measure trends. We regress these trends on the growth rate of a number of variables considered to be relevant by the literature on subjective well-being or happiness.

Although it is in general difficult to assess the validity of individual-level theories on macroeconomic data, the specific problems of the life satisfaction literature speak for our approach. Duesenberry's keeping-up-with-the-Joneses theory would equally predict that although individuals' life satisfaction may fluctuate, no macroeconomic developments can induce changes as an increase in e.g. national income would affect both single individuals and the neighbours with which they compare their situation. Macroeconomic developments therefore leave the relevant comparisons with reference groups unchanged. Irwin's (1944) aspiration theory, on the other hand, would imply that macroeconomic developments can and do affect life satisfaction when, for example, the average income increases more than expected and people's general aspirations are thus more than met. As such, the present analysis cannot reject Duesenberry's theory but would be capable of confirming the empirical validity of Irwin's aspiration theory as it circumvents the problem of observational equivalence.

We nevertheless also perform a test of a macrolevel version of the former theory to explore whether there are population-wide effects of comparisons with neighbouring countries. We do this by including the growth acceleration in GDP per capita and the growth of government consumption, both relative to neighbouring countries, even though we do not expect individuals to possess accurate information on comparative growth rates. Instead our hypothesis is that people collect relevant and reliable signals from the media and from their daily business in a parallel way to, for instance, the functioning of dividends as signals of future earnings of firms.[2] Furthermore, we introduce changes in the current account among the explanatory variables. The same argument applies here as above, i.e. an increase in the surplus or a decrease in a deficit is not per se expected to influence satisfaction or well-being, but instead assumed to function as a signal regarding the future state of the economy and eventual policy changes that are likely to be widely reported in the popular media.

Our analyses show that current GDP growth does not affect the trends but growth relative to growth in the preceding period does. The same impact from acceleration in the variable holds for the growth in life expectancy while the growth in the current account balance also exerts a positive influence. Finally, acceleration of GDP and government consumption relative to neighbours is found to influence trends in life satisfaction significantly. Since accelerated growth is needed to influence trends in life satisfaction, the results therefore provide support for Irwin's (1944) as well as Easterlin's (1995) conjecture that people's aspirations change over time, thereby accounting for the relatively stable long-run levels of satisfaction.

Before proceeding, we should emphasize that our paper, though focusing on the empirical picture, holds implications for the theoretical development of happiness studies, as it provides an alternative test of fundamental ideas within the present Kuhnian paradigm of happiness theory. We hope readers hold this aim in mind when reading the paper. The rest of the paper is structured as follows. Section 2 describes the data and Sect. 3 outlines the trend measure used and the trends obtained through this measure. Section 4 analyses the determinants of these trends while Sect. 5 concludes.

2 Data

The data on life satisfaction derive from the semi-annual Eurobarometer surveys that in most years have asked the question ''On the whole how satisfied are you with the life you lead?'' The answers are given on a Likert scale from one to four where the possible answers are: 4—very satisfied; 3—fairly satisfied; 2—not very satisfied; and 1—not at all satisfied. This and similar questions on domain satisfactions have been used in numerous studies, giving birth to a large literature which supports the use of individuals' responses to such subjective questions as proxies for their underlying well-being (van Praag and Ferrer-i-Carbonell 2004).

The national average scores are used in the next section to form the life satisfaction trends across four-year periods. For the sake of exposition, Fig. 1 illustrates the levels at the end of the period analysed in the present paper, the autumn of 2002. On the four-point scale, the average happiness in the 15 'old' EU countries is 3.05. Portugal has the least satisfied population in our sample with an average level of 2.52 while the Danes are the

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[2] For a treatment of signalling effects in financial economics, see Iqbal and Habibur (2002), or see the classic work on signalling by Spence (1973).
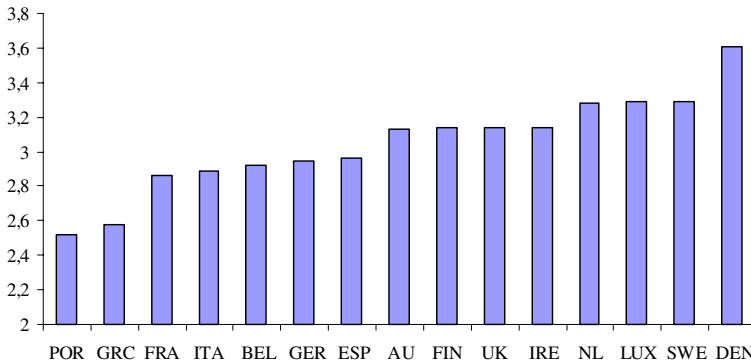
Fig. 1 Average life satisfaction in 15 EU countries in late 2002. (*Source*: Eurobarometer)

most satisfied with a score of 3.61 and a quite substantial margin to Sweden as number two. These widely different levels are (more or less) the levels around which our trends in life satisfaction occur, hence it should be remembered in the following that the marginal effect of a given trend is likely to vary across countries.

A large set of indicators have been used to explain such cross-country differences in life satisfaction; Oswald (1997) and Diener and Seligman (2004) give comprehensive surveys. Other studies have focused on subjective well-being for specific groups in the population. A recent very broad survey by Bjørnskov et al. (in press) with focus on groups in the population based on data for 73 countries found that only a small number of factors robustly influence life satisfaction across countries while the importance of many factors analysed earlier in the literature is rejected. In a more specific group related, approach Mullis (1992) studied a sample of 55–69-years-old American men and found an impact on well-being from income and wealth interacted with other variables for this group. Bingley et al. (2005) in a retirement study found for another specific group, people 60–66-years-old, that the opening of a non-health related early retirement option in 1979 in Denmark had a clear impact on reported well-being in the affected group. For low wage earners benefits in the program nearly compensated the loss of earnings so that the impact on well-being relates to a jump in leisure time.

For the purpose of exploring the determinants of our trends in the present paper, we employ the growth rates of a set of indicators that are often found to matter in cross-sectional studies as those outlined above and for which we have sufficiently long series from all 15 countries in our sample; these data are summarized in Table 1. We use both the growth rates of any variable X in the same period as trends are measured, and the growth rates relative to growth in the preceding period. We denote these variables $D X$ and $RD X$, respectively. First of all, we employ GDP per capita data from the Penn World Tables, Mark 6.1 (Heston et al. 2002) as GDP per capita is central to controversies in the happiness literature. Further, we use as a control the growth rate in the current account relative to GDP, which has often been considered as an important indicator for the success (or failure) of economic policy. We supplement this with data on life expectancy as an indicator of health, derived from World Bank (2004), and government consumption as percent of GDP, derived from the Penn World Tables. While the inclusion of health is standard in the happiness literature, we include government consumption as it could capture opposing effects. First, government provision of public goods could in principle have similar effects as GDP growth to the extent that the two are substitutes. Second, however, when

Table 1 Descriptive statistics for the variables used in the econometric analyses

Variable	Average	SD	Observations
Life satisfaction, late 2002	3.05	0.28	15
Life satisfaction trend	0.06	1.46	158
D GDP per capita	0.09	0.09	180
RD GDP per capita	−0.08	2.81	173
D Current account	−0.83	11.54	176
D life expectancy	0.01	0.006	195
RD life expectancy	1.03	1.72	180
D Government consumption	0.02	0.08	195
RD Government consumption	−0.07	5.09	180

Note: D denotes growth rate and RD denotes growth rate relative to growth in the preceding period

government consumption increases it also logically implies that citizens relinquish control of a larger share of national income, which could lead to lower subjective well-being (cf. Bjørnskov et al. 2007). In a final set of analyses, we also use the growth of GDP per capita relative to that of neighbouring countries, i.e. we divide *D X* of a country with the average of its immediate geographic neighbours.

In Sect. 4, we explore what causes life satisfaction to vary over time across the 15 countries. As our dependent variable is trends in life satisfaction, we employ changes of the variables listed in Table 1. Before employing the data, we next turn to the construction of our dependent variable, the trends in life satisfaction, in Sect. 3.

3 Measuring trends in life satisfaction

Measuring a trend is usually—but not always—fairly trivial: one subtracts the level at the starting point of any period in which one wants to measure the trend from the ending point of that period. However, the existing data on life satisfaction presents any researcher with a set of specific problems of which two are particularly worrisome. First, there are often missing observations in the data, which naturally is problematic when those missing are starting and ending points. This is nonetheless a problem that under most circumstances can be dealt with by, e.g., inserting estimates or informed guesses. Second, there is the problem of noise in the data. Life satisfaction data are obtained from surveys where respondents rate their satisfaction with life on a discrete scale, in our case the Eurobarometer surveys. If, for example, the survey is conducted in a period of particularly good weather, people's ratings may be biased upwards compared to a situation of normal weather, resulting in what is known as ''sunshine effects'' in the finance literature (Saunders 1993; Hirshleifer and Shumway 2003). Many other events can be expected to exert entirely spurious influences on people's subjective perceptions of their quality of life, inducing a substantial uncertainty in the data. Such uncertainty makes any trends measure very sensitive to which precise starting and ending points one chooses. If the starting point observation derives from a survey conducted in a period of good weather, we risk observing a negative trend when there is none, i.e. when the 'true' starting point observation equals the ending point. As noted above, we might even not have a trend at all, if one of the observations is missing since considerable uncertainty also to some extent invalidates standard solutions to the first problem.
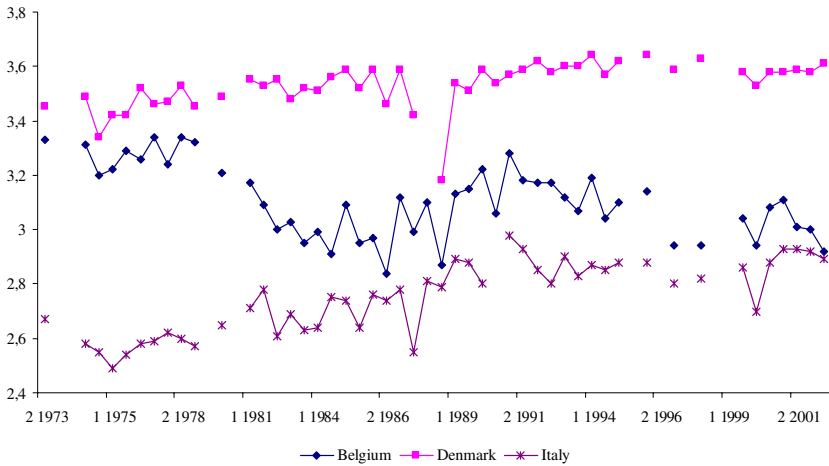
Fig. 2 Trends in life satisfaction in Belgium, Denmark and Italy, second half-year 1973 to second half-year 2002 (Construction of the trend variable is explained in the text)

Figure 2 illustrates these problems by plotting the life satisfaction scores over time for the three atypical countries in our sample, Belgium, Denmark and Italy. Both Denmark and Italy seem to have had positive trends over the period 1973–2002 while the Belgian trend seems to have been negative, at least until the early 1980s.[3] However, missing observations is clearly a problem if one wants to measure short-term trends. The considerable noise in the data is also quite obvious, illustrating our second problem. Our approach to these problems is to use an alternative trends measure. Although we do not claim that the measure is ideal, we believe that it solves the most urgent problems in a practical manner. Specifically, we use the modification of Kendall's Tau outlined in Eq. 1. Put verbally, our trends are constructed by taking the average of all differences between all data points within the trend period. First, by employing all available information within the period this makes the measure insensitive to missing observations, even at the start or end of the period; hence, it solves the first problem outlined above. Second, by averaging all differences within the period, we gain a measure that is much less sensitive to random fluctuations such as e.g. the weather that induces noise in our data. The modification solves a problem with Kendall's original indicator, which is calculated as the average of up or down movements, where upward trends are given the value 1, and downward trends the value -1. Instead, we use the average of the actual percentage increases between any two observations of happiness x within the period from time i to j as in Eq. 1; K is the number of unordered permutations of any two observations in the period. By doing so, we construct a parametric trends measure that not only can be interpreted quantitatively, which Kendall's Tau cannot, but moreover has an intuitively simple interpretation as the trends multiplied by 60 measure the approximate average yearly percentage increase within the given four-year period that we use.

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[3] The three countries are atypical in the sense that the other countries for which data are available for the full observation period do not exhibit any strong trends. However, see also Veenhoven (2005) for the long-run trends in eight European countries. A full set of plots can be obtained from the authors.

Table 2 Determinants of life satisfaction trends, contemporaneous growth rates

	1	2	3	4
Lagged trend	0.231** (2.543)	0.229** (2.526)	0.232** (2.568)	0.213** (2.308)
Twice-lagged trend	−0.151* (−1.658)	−0.148 (1.628)	−0.176* (−1.910)	−0.162* (−1.777)
D GDP per capita		−0.091 (1.041)		
D Life expectancy			0.123 (1.389)	
D Government consumption				−0.100 (−1.120)
Observations	128	128	128	128
Pseudo R-Square	0.041	0.041	0.048	0.043
F-statistic	3.698	2.829	3.127	2.889
SEE	1.451	1.450	1.445	1.449

Note: All regressions include a constant term; coefficients are standardized

*** Denotes significance at $p < 0.01$; ** denotes significance at $p < 0.05$; * denotes significance at $p < 0.1$

$$\tau_i = \frac{\sum_{j,k \in \Theta_i} (x_j - x_k)/x_k}{K_{\#\Theta_i,2}}, \quad \Theta_i = \left\{ x_i \ldots x_j \middle| i{<}j, \, x \neq \varnothing \right\} \tag{1}$$

This trends measure is the dependent variable in the rest of the paper. We use periods overlapping two years (e.g. 1980–1984, 1982–1986), which gives us 158 observations.[4] The trends range from a minimum of −4.48—Belgium in the period 1978–1982, which is clearly visible in Fig. 2—to a maximum of 3.86 (Ireland, 1988–1992) with an average of 0.06.

4 Results

Turning to our empirical findings of employing this trends measure, Table 2 reports the results of entering the contemporaneous growth rates of the control variables.[5] Column 1 first of all shows that there is some persistence in the trends measures, as indicated by the lagged trends (the dependent variable observed in the preceding period), which is due to our using overlapping periods. The coefficient on twice-lagged trends is negative as would be expected when life satisfaction fluctuates around a stable level or stable long-run trend, yet this effect is rather weak. The absence of a strong regression-to-mean (regression-to-zero) effect thus indicates that the effects of shocks to life satisfaction trends are probably not fully transitory at the national level. While this does not fit the implications of set-point theory, it is consistent with studies showing that even transitory events can have permanent effects by altering set points (Lucas et al. 2004, Heady 2006).

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[4] A full number of observations are only available for nine of the countries, while data for the six remaining countries are included from the time they enter the EU. The number is further limited by missing data on control variables for certain countries.

[5] All results in the following are estimated using OLS, which is a valid estimation strategy here as tests reject the three standard problems of autocorrelation, heteroscedasticity and contemporaneous correlation. In Table 3, column 2—that will be used as a baseline specification—the Durbin–Watson test rejects problems of autocorrelation (DW = 2.129), White's general test for heteroscedasticity clearly rejects that the residuals are heteroscedastic ($\chi 2$ (10) = 6.32; $p < 0.79$), and contemporaneous correlation seems not to be a problem as the correlation between the trend in a country and the average trend in its neighbouring countries is weak ($r = 0.28$).

When turning to the control variables, one of the first things to note is that current income growth (D GDP per capita) does not influence the life satisfaction trends as would be expected from simple economic theory. The same lack of significance is found for the current growth in life expectancy and the current growth of government consumption, which even enters with a negative sign. As a response to this lack of significance, we instead include the relative growth rates as a way to check whether accelerating growth— i.e. surprise improvements—provide any explanation of the trends in life satisfaction. In other words, the results reported in Table 3 answer the question whether improvements beyond the adaptively warranted expectation of individuals matter and provide a test of Irwin's aspiration theory.

When compared to growth in the previous period income (RD GDP per capita) provides some explanation for the trends. What matters is therefore not growth per se, but *accelerating* growth—in other words, surprise changes in income growth materialize in the trends, which is consistent with theories of aspirations in which individuals get used to a certain continuous improvement. The effect is moreover of considerable size: a one standard deviation change to this variable generates an increase of 28% of one standard deviation in the yearly trend. Entering the contemporaneous growth of the current account increases the explanatory power of the regression.[6] The relative growth of life expectancy is, however, again seen to be insignificant, as is the relative growth of government consumption.

Finally, two further results can be 'squeezed' out of the data. Adding the variable RD per capita relative to neighbouring countries to the baseline specification in Table 3 shows that doing better in this area than your neighbours has a significant impact on the life satisfaction trend. For example, for Spain the variable is calculated simply by dividing the Spanish GDP per capita growth with the average in France and Portugal. In this way we test for a macro-level version of Duesenberry's (1949) keeping-up-with-the-Joneses theory. The results thus suggest that when Spanish GDP growth picks up faster than French or Portuguese growth, its citizens tend to become more satisfied with their lives.[7] The final result is that even if neither the growth rate of government consumption itself nor surprise growth relative to neighbours prove not to matter, the contemporaneous ratio of government growth to that of neighbouring countries is positively associated with trends in national happiness.

Table 4 finally explores whether this is due to outliers having an impact on the general picture. The results in the table are obtained by excluding observations with a residual above ±2 standard deviations. It is first of all clear that the effects of current account growth are less significant although the coefficient remains of about the same size throughout. The relative GDP growth rate remains significant at $p < 0.01$ throughout, indicating that without outliers the effect of a one standard deviation change to relative growth corresponds to 34–40% of one standard deviation of the trends, which corresponds roughly to a 3% increase in life satisfaction over a four-year period in the average country. The robustness exercise also shows that the comparison effect with neighbouring countries remains significant and highly important when excluding outliers. The relative growth of

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[6] It should be noted that the relative growth of the current account is never significant. This result is hence contrary to our general findings regarding the dimension of the variables.

[7] It may be worth noting that an earlier working paper version of this paper also explored the heterogeneity of the GDP effect. Our further results in that paper suggest that life satisfaction in countries in which the median voter political ideology is placed to the right on a traditional left-to-right scale is more sensitive to growth changes than countries placed to the left.

Table 3 Determinants of life satisfaction trends, relative growth rates

	1	2	3	4	5	6	7
Lagged trend	0.247*** (2.770)	0.249*** (2.710)	0.228** (2.451)	0.293*** (3.169)	0.263*** (2.903)	0.249*** (2.708)	0.285*** (3.044)
Twice-lagged trend	−0.211** (−2.307)	−0.197** (−2.090)	−0.161 (−1.631)	−0.212** (−2.207)	−0.232** (−2.499)	−0.200** (−2.117)	−0.205** (−2.191)
RD GDP per capita	0.283*** (3.323)	0.286*** (3.223)	0.277*** (3.129)	0.369*** (4.164)	0.249*** (2.800)	0.288*** (3.421)	0.297*** (3.356)
D Current account		0.149* (1.687)	0.151* (1.717)	0.153* (1.740)	0.143* (1.648)	0.145* (1.632)	0.143 (1.617)
RD life expectancy			0.112 (1.224)				
RD government consumption				−0.002 (−0.028)			
RD GDP per capita relative to neighbour					0.190** (2.119)		
RD government cons. relative to neighbour						−0.059 (−0.679)	
D government cons. relative to neighbour							0.177** (1.989)
Observations	125	116	116	110	115	115	112
Pseudo R-Square	0.104	0.131	0.135	0.186	0.158	.127	.156
F-statistic	5.803	5.352	4.601	5.998	5.315	4.353	5.141
SEE	1.404	1.419	1.416	1.197	1.397	1.422	1.396

Note: All regressions include a constant term; coefficients are standardized

*** Denotes significance at $p < 0.01$; ** denotes significance at $p < 0.05$; * denotes significance at $p < 0.1$

Table 4 Determinants of life satisfaction trends, testing for robustness by excluding observations with a residual above ± 2 standard deviations from the analyses

	1	2	3	4	
Lagged trend	0.247*** (2.679)	0.309*** (3.374)	0.243*** (2.657)	0.352*** (4.091)	0.233** (2.234)
Twice-lagged trend	−0.178* (−1.882)	−0.222** (−2.358)	−0.167* (−1.750)	−0.331*** (−3.659)	−0.272** (−2.549)
RD GDP per capita	0.384*** (4.362)	0.379*** (4.325)	0.380*** (4.466)	0.325*** (3.838)	0.444*** (4.590)
D Current account		0.156* (1.789)	0.111 (1.320)	0.139* (1.689)	0.153 (1.627)
RD Life expectancy			0.235*** (2.666)		
RD GDP per capita relative to neighbour				0.247*** (2.882)	
D Government cons. relative to neighbour					0.169* (1.772)
Observations	117	109	109	110	90
Pseudo *R*-Square	0.153	0.210	0.250	0.282	0.225
F-statistic	8.006	8.169	8.199	9.547	6.219
SEE	1.137	1.168	1.136	1.151	0.852

Note: All regressions include a constant term; coefficients are standardized

*** Denotes significance at $p < 0.01$; ** denotes significance at $p < 0.05$; * denotes significance at $p < 0.1$

life expectancy now is strongly significant, indicating that the absence of an effect in Table 3 is due to outliers. The size of this effect is moreover comparable to that of GDP growth. The last result to come out of Table 4 is that growth in government consumption relative to neighbouring countries also remains significant, although only at $p < .10$. Along with the substantial reduction in sample size, which indicates that the inclusion of this final variable causes substantial noise in the overall estimates, this finding may thus be questionable.

5 Discussion and summary

Economic theory usually assumes that individual utility is determined by income, leisure and a few other factors. The recent literature on subjective well-being has questioned this assumption by suggesting that above some fairly low level of average national income, average self-reported life satisfaction does not increase with income. A number of explanations have been proposed to solve this dilemma in order to assess whether economic theory is fundamentally wrong, flawed, or simply needs to be supplemented with additional factors. However, in recent years this finding itself has been questioned, making the dilemma even more puzzling.

Psychologists interested in subjective well-being have for more than half a century operated with aspiration theory, a kind of thinking that has only had rather limited influence in economics and happiness studies (e.g. Irwin 1944). According to this theory, individuals' life satisfaction is determined not by the absolute level of objective welfare but by the gap between their aspirations and their actual achievements. That individual life

satisfaction is significantly affected by aspirations has recently received direct statistical support by e.g. Stutzer (2004). To explain the absence of any clear trend in life satisfaction in most of the 15 countries considered in this paper, we need one more piece to solve the puzzle: that people change their aspiration levels over time. Psychologists and sociologists routinely define such adaptation as reducing the hedonic effect of constant stimuli. Hence, if people adapt not only to, for example, their new income level but also to a situation in which this level grows constantly over time, their aspirations will also grow constantly, which explains the surprisingly constant levels of life satisfaction across most rich countries.

The view that individuals dynamically adapt their aspirations and that the gap between these aspirations and the actual achievements determine life satisfaction is consistent with our findings in this paper. We find that GDP growth per se does not induce positive trends in life satisfaction in 15 European countries for which we have semi-annual observations since 1973, thus rejecting the standard assumptions in economics as indeed most of the happiness literature does. As such, our first finding sides, so to speak, with Richard Easterlin in his recent debate with Michael Hagerty and Ruud Veenhoven in *Social Science Indicators*. The two potential explanations for the absence of an effect are that while individuals' situations improve so do those of the individuals with whom they compare themselves, and that individuals' aspirations simply grow with their income. We do, however, find that *accelerating growth* in both per capita GDP and life expectancy creates positive trends, consistent with the view that people get more satisfied as their aspirations are more than met. In other words, only surprise improvements in individuals' health status resulting from, for example, new treatments, improved drugs or changing overall habits are reflected in the life satisfaction trends, which would not have been the case had comparison theory been sufficient to explain the income paradox of happiness research.

This view must nevertheless be supplemented with a set of other observations. First, we find that the contemporaneous growth of the current account balance is associated with our trends in life satisfaction. At first, this result seems rather puzzling since the current account should not affect individuals' lives, economic situations or well-being in any direct manner. However, in media reports on the state of the economy and its immediate future, the current account often takes centre stage. We therefore hypothesize that individuals perceive it as a signal of the future state of the economy, i.e. the development of the current account comes to be an indicator of economic optimism in the population since the media has sensitised the population to this particular bit of information. In most of the period we study, there has in a number of countries been an apparent trade-off between growth and unemployment on the one hand and the current account on the other hand. What we find may therefore best be interpreted as an expectations effect implying room for future economic acceleration when the current account improves and vice versa when it deteriorates.

A second result worthy of consideration is that we find two types of developments relative to neighbouring countries to matter: faster surprise GDP growth and faster growth of government expenditures than in neighbouring countries induce positive trends in life satisfaction. Even at the national level, we therefore also find evidence of Duesenberry's keeping-up-with-the-Joneses effect as people apparently compare their situation to that of citizens of neighbouring countries. However, an additional word of caution is necessary when interpreting these effects. Contrary to the original ideas in Duesenberry (1949) the effects relative to neighbouring countries can probably not be interpreted as a simple comparison between readily observable material improvements since only rather few citizens of any given country possess sufficient firsthand information of the real economic,

political and social situations in neighbouring countries. Instead, most people are likely to base their comparisons on information in the media and on hearsay, which might not always be ideally accurate. The finding that people seem to compare their situation to neighbouring countries must therefore probably be interpreted as pertaining to the subjective well-being of individuals reacting to *signals* of their relative status as citizens of a nation instead of comparisons of anything *real*. In particular the observation that the growth of government consumption relative to that of neighbouring countries induces positive happiness trends while government consumption growth per se is negatively associated with happiness trends (although insignificantly) clearly supports this interpretation of the findings. These effects thus lead us to emphasize the need to take individuals' subjective perceptions of their situation into account, even in macro-level analysis.

To summarize, our findings suggest that in order to understand the development of subjective well-being across countries one need to take three factors into account: (1) the well-being of individuals is partly determined by the gap between their aspirations and their actual achievements, not by their objective well-being; (2) individuals as well as entire populations adapt to steady improvements by changing their aspirations, and (3) individuals may tend to compare to the situation in neighbouring countries when assessing their subjective well-being. However, we end the paper by stressing the need to explore these effects further as this paper is a first foray into these questions. For example, future research may explore whether the conclusions can be replicated for other countries such as the US for which sufficient time-series data are available. Additional research, theoretical as well as empirical in all of the social sciences, is needed to determine which of the potential interpretations of the effects in this paper can be supported, and to explore the significance of signalling for subjective well-being.

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