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## What Makes for a Better Life?

THE DETERMINANTS OF SUBJECTIVE WELL-BEING IN OECD COUNTRIES – EVIDENCE FROM THE GALLUP WORLD POLL

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OECD COUNTRIES: EVIDENCE FROM THE GALLUP WORLD POLL**

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**WHAT MAKES FOR A BETTER LIFE? THE DETERMINANTS OF SUBJECTIVE WELL-BEING IN OECD COUNTRIES: EVIDENCE FROM THE GALLUP WORLD POLL**

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**ABSTRACT*****What makes for a better life? The determinants of subjective well-being in OECD countries: evidence from the Gallup world poll***

This paper uses data from the Gallup World Poll to explore the determinants of subjective well-being. The paper builds on the existing literature on the determinants of subjective well-being in three areas. First, the paper systematically examines the drivers of measures of affect as well as the determinants of life satisfaction that are more prevalent in the existing literature. Overall, items relating to health status, personal security, and freedom to choose what to do with one's life appear to have a larger impact on affect balance when compared to life satisfaction, while economic factors such as income and unemployment have a more limited impact. The second part of the paper considers the degree to which there is heterogeneity in the weights assigned by different population sub-groups to the different determinants of subjective well-being. Relatively small differences are found between men and women, but priorities change significantly over the life course. Finally, the paper uses OECD data on the labour market and health policy regimes in different countries to test for the impact of these policy regimes on subjective well-being. Significant results are found for the replacement rate for unemployment assistance, employment protection legislation, and the extent of health co-payments. Although these results are tentative, they suggest that looking for the impact of policy changes on subjective well-being in large cross-country datasets is a promising area for research.

**RÉSUMÉ*****Quels sont les facteurs qui influent sur notre qualité de vie ? Les déterminants du bien-être subjectif dans les pays de l'OCDE : données extraites de l'enquête Gallup World Poll***

Fondé sur des données issues de l'enquête *Gallup World Poll*, ce rapport analyse les déterminants du bien-être subjectif. Il est en outre étayé par les travaux antérieurs menés sur les facteurs du bien-être subjectif dans trois domaines. Tout d'abord, l'étude passe systématiquement en revue les caractéristiques des mesures relatives aux ressentis, ainsi que les critères qui déterminent la satisfaction à l'égard de la vie, qui sont plus répandus dans les publications existantes. Dans l'ensemble, les facteurs relatifs à l'état de santé, à la sécurité des personnes et à la liberté qu'ont les individus de choisir la vie qu'ils veulent mener semblent peser plus lourd dans la balance entre ressentis négatifs et ressentis positifs que la satisfaction à l'égard de l'existence, tandis que les facteurs économiques, comme le revenu et le chômage, ont une influence plus limitée. La deuxième partie du rapport examine dans quelle mesure l'importance accordée aux différents déterminants du bien-être subjectif varie en fonction des catégories de population. Si les écarts observés entre hommes et femmes sont relativement limités, il ressort que les priorités ne cessent d'évoluer tout au long de la vie. Enfin, le rapport s'appuie sur les données de l'OCDE relatives aux politiques nationales du marché du travail et de la santé pour évaluer l'impact de l'action publique sur le bien-être subjectif. Il semble que le taux de remplacement de l'assistance-chômage, la législation sur la protection de l'emploi et le niveau de participation des assurés sociaux au coût des soins jouent un rôle majeur. S'ils restent indicatifs, ces résultats donnent néanmoins à penser que l'étude de l'impact des réformes sur le bien-être subjectif dans les grandes séries de données internationales constitue un axe de recherche prometteur.

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## Introduction

1. The OECD, which has long been involved in measuring societal progress, launched in May 2010 the “OECD Better Life Initiative”, as part of its 50<sup>th</sup> Anniversary celebration. This initiative aims to provide comprehensive evidence on well-being patterns and trends in the OECD area and some emerging countries. A key element of the Better Life Initiative is the *How’s Life?* report, published by the OECD in October 2011. *How’s Life?* uses 55 statistical indicators to describe the average level and distribution of outcomes across eleven distinct dimensions that are thought to be of general importance to the well-being of people in all parts of the world. The eleven dimensions of well-being used in *How’s Life?* are broadly consistent with those put forward by the report of the Sen/Stiglitz/Fitoussi Commission (Stiglitz *et al.*, 2009) and by other similar attempts to monitor well-being in individual countries.<sup>2</sup>

2. One of the eleven dimensions of well-being considered in the Better Life Initiative and in *How’s Life?* is subjective well-being. Recent years have seen an explosion in the literature on the causes and correlates of subjective well-being, brought about by the increasing availability of data and evidence showing that self-reports of life satisfaction and current feelings are valid and consistent measures of people’s sense of well-being.

3. Considering subjective well-being indicators when assessing individual and society’s well-being is important *per se*, because these indicators provide additional information relative to information on more objective dimensions. In addition, indicators of subjective well-being allow for better understanding of the relationship between subjective and objective well-being, and what life circumstances determine people’s sense of well-being. This paper investigates the latter question in depth using data from the Gallup World Poll (GWP), following previous extensive research on the subject.

4. The aim of this paper is to build on the existing literature to bring new evidence in two areas. First, the paper assesses the relative importance of different objective achievements to various subjective well-being measures in OECD countries and some other major economies of the world. This includes looking at the determinants of measures of affect, as well as of the determinants of life evaluations, which are the more prevalent measures in the existing literature. Second, the paper attempts to estimate the impact of government policy on subjective well-being in three specific areas: health co-payments, unemployment insurance, and employment protection legislation.

5. The first section of this paper – measuring subjective well-being – discusses the case for taking measures of subjective well-being as a robust and relevant source of information on the overall well-being of the population. An outline of the different elements of subjective well-being is provided, along with a brief summary of the evidence on the validity and reliability of these measures. This is followed by a review of the existing literature on the determinants of subjective well-being, with a particular focus on the OECD’s *How’s Life?* outcome domains.

6. The core of this paper uses individual data from the Gallup World Poll to estimate a subjective well-being function for OECD countries. This analysis is conducted using both a measure of overall life evaluation and a measure of the net affect balance of individuals, in order to test whether the particular type of subjective well-being measure used affects conclusions about the nature of the underlying well-being function. After analysing the degree to which the estimated well-being functions are consistent with

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<sup>2</sup> See for example reports by Australia (*Measures of Australia’s Progress*), Finland (*Indicator- Set of Indicators for Social Progress*), Germany (*Sustainable Development Report*) and New Zealand (*Measuring New Zealand’s Progress Using a Sustainable Development Approach*).

the range of dimensions used in *How's Life?*, the paper considers the relative importance of different dimensions by looking at the relative size of the standardized coefficients for each outcome indicator.

7. Having examined the relative impact of different factors on subjective well-being, the paper then uses an OECD dataset on labour market and health policies across OECD countries to test for the impact of policy settings in these areas on subjective well-being. The paper concludes by discussing the implications of these findings for the use of subjective well-being measures as a proxy for overall well-being when evaluating policy options.

### Measuring Subjective Well-being

8. Measures of subjective well-being capture information on how people experience their lives. Although sometimes characterised as concerned with “happiness”, subjective well-being comprises several distinct concepts. In particular, an important distinction is usually made between *evaluative* measures of well-being, which reflect some cognitive reflection on the part of the respondent, and measures of *affect*, which capture the respondent’s emotional state at a particular point in time (Sen, Stiglitz and Fitoussi, 2009). From this, it is typically argued that subjective well-being has three distinct components<sup>3</sup>:

- *life evaluation*, i.e. the cognitive judgement by a person about their life as a whole;
- *positive affect*, i.e. the experience of positive feelings and emotions by a person at a particular point in time;
- *negative affect*, i.e. the experience of negative feelings and emotions by a person at a particular point in time.

9. *Life evaluations* capture a reflective assessment of how one’s life is going. They are the result of a cognitive evaluation on the part of the individual rather than a description of current emotional state. One strength of measures of life evaluation is that they appear to tap the same underlying construct that people use when they pause and make a conscious decision about whether one course of action is preferable to another (Kahneman, 1999, Helliwell and Barrington-Leigh, 2010). Although, in practice, many actual decisions are based on intuitive judgements or simple heuristics (see for example, Kahneman, 2011), many economic models of human behaviour assume that individuals make decisions on the basis of a rational reflection of the costs and benefits of alternative outcomes. It is for this reason that life evaluations are sometimes characterised as measures of “decision utility” (Kahneman and Krueger, 2006). Many of the most commonly used measures of subjective well-being are indeed evaluative measures, reflecting the strong interest by economists in the basis of decision-making.

10. Measures of *affect* can be thought of as measures of particular feelings or emotional states, and affect is often measured with reference to a particular point in time, and mapped into the specific activities that people were undertaking at that time. Such measures capture how we experience life rather than how we remember it and are sometimes described as “experienced utility” (Kahneman and Krueger, 2006). While an overall evaluation of life can be captured in a single measure, affect has at least two distinct

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<sup>3</sup> A fourth component of subjective well-being is sometimes also identified, referred to as “flourishing” or “eudaimonic” well-being (Huppert *et al*, 2009, NEF, 2009, Clark and Senik, 2011). Eudaimonic well-being goes beyond the respondent’s reflective evaluation and emotional states to focus on functioning and the realisation of people’s potential. Approaches to measuring eudaimonia are based on both psychological and humanist literature, which identifies key universal ‘needs’ or ‘goals’. The approach represents a useful response to the criticism that the measurement of subjective well-being is built purely on hedonistic philosophy.



hedonic dimensions: positive affect and negative affect. Positive affect captures positive emotions such as the experience of happiness, joy, and contentment. Negative affect, on the other hand, comprises the experience of unpleasant emotional states such as sadness, anger, fear, and anxiety. Although the two dimensions of affect are not opposites (positive emotions are not just the absence of negative emotions), there is good reason to believe that people can meaningfully assess the net impact of multiple emotions (Kahneman, 1999) in terms of an overall “good/bad” axis. For this reason, positive and negative affect are sometimes combined into a measure of “affect balance” that records the extent to which positive affect exceeds negative affect in a person at a given point in time (e.g. Diener, Kahneman, Tov, and Arora 2010).

11. A key point to note is that each of the three dimensions identified above is to some extent independent of the other two (Kahneman, 1999). It is possible, for example, to report a positive life evaluation overall, without necessarily experiencing many positive feelings at a particular point in time. Similarly, positive affect is not simply the absence of negative affect: people can be in a state where they experience no strong positive or negative feelings, or in a state where they experience both.

12. Most of the literature looking at the determinants of subjective well-being has focused on life evaluations – particularly measures of overall life satisfaction. This reflects both the conceptual fit between overall life satisfaction and how economists model decision-making by individuals, and also data availability. Measures of affect balance have been less used in this way, largely because of the lack of good data on positive and negative affect. Despite this, Krueger and Kahneman (2006) argue that measures of affect are, in principle, preferable to measures of life evaluation for policy purposes, as they have better inter-personal comparability and because measures of affect capture the impact of life circumstances on what people actually experience.

### ***Validity and Reliability***

13. The case that it is possible to measure subjective well-being in a valid and reliable fashion is now strong. Measures of subjective well-being produce reliable results in that people generally give similar answers if asked the same question at different points in times. Test-retest results for subjective well-being measures yield correlations of between 0.6 and 0.7 for self-reports done on the same day (Krueger and Schkade, 2007). Multiple item measures of subjective well-being do better than single questions, with test-retest scores close to 0.78 for time periods measured in weeks. These correlations are lower than for some objective measures of economic variables, such as income (0.9), but not dissimilar from other more complex economic variables such as consumption expenditure (0.6) measured over similar time periods (Carinna, Evans, Ravindal, and Xua, 2009).

14. Questions on subjective well-being also have a high degree of *face validity*, in that concepts such as “satisfaction” or “happiness” are easy for people to relate to. For example, respondents generally have little difficulty answering questions on subjective well-being, with item-specific non-response rates much lower than for questions on income (Rässler and Riphahn, 2006). Subjective measures also show *convergent validity* (i.e. they are supported by other objective measures that proxy for subjective well-being). For example, subjective measures of well-being correlate well with frequency of expression of positive emotions and with frequency of smiles – particularly ‘unfakeable’ or ‘Duchenne’ smiles (where the skin around the subject’s eyes ‘crinkles’ in response to automatic and largely involuntary muscle contractions). Biological measurements, including left/right brain activity and levels of the stress hormone cortisol, show a consistent relationship with self-ratings of well-being (Diener, 2011). In addition, both ratings made by friends, and ratings made by strangers correlate well with self assessments (Kahneman and Krueger, 2006).

15. *Construct validity* captures the degree to which a measure behaves in the expected way. For subjective well-being, construct validity is supported by good evidence suggesting that it meaningfully

predicts behaviour, including the risk of suicide, sociability, extroversion, quality of sleep, and happiness of close relatives (Diener and Tov, 2005). Changes in objective circumstances, including becoming unemployed and the onset of disability, have been shown to cause large and lasting changes in life satisfaction at the individual level (Lucas, 2006).

16. Despite the robust body of literature indicating that it is possible to measure subjective well-being meaningfully, existing measures of subjective well-being face some significant limits. Measures of subjective well-being can be subject to significant impacts from passing factors influencing the respondent's mood such as the weather on the day of the interview or the outcome of a sporting contest. However, there is relatively little evidence of this effect in the case of life evaluations (Lucas and Lawless, 2011, Eid and Diener, 2004), and even for measures of affect – which are intended to capture momentary feelings – the imparted bias is not as large as might be expected (Harmatz et al, 2000). This occurs, in part, because surveying generally takes place over an extended period of time thus ensuring that all responses to a question are not influenced by a single time-specific event.

17. The most significant issue affecting validity and reliability is that of differences in response styles between individuals and groups. When considering differences in responses between individuals, the risk is that different people may interpret response scales differently – for example, what one person refers to as a life satisfaction of “6”, another may refer to as a “9”. This issue, although clearly important, is likely to have limited practical impact. For almost all statistical purposes, it is not necessary to make direct comparisons of individual scores. For example, in a sufficiently large sample, differences in response styles between individuals will average out and are unlikely to bias population averages.

18. The issue of differences in response styles is more problematic when these differences are correlated with characteristics of the groups studied, such as when comparing subjective well-being across countries. Here there is good reason to believe that differences in response styles may be a problem. Although studies have indeed shown that cultural differences do not generally lead to large differences in assessments of the drivers of life satisfaction (Helliwell, 2008), there is good reason to believe that cultural factors do impact on the average response levels in different countries. In particular, it is often noted that East Asian countries tend to report a lower level of life satisfaction than might otherwise be expected, while Latin American countries report a higher level of life satisfaction (Diener et. al., 2000). However, it is also important not to over-state the problems caused by cultural differences in response styles. While such differences have the potential to bias international rankings of average life satisfaction in a country, they will generally have little impact on analysis of the determinants of well-being<sup>4</sup>. Further, cultural response styles may impact more strongly on life evaluations – such as measures of life satisfaction – than on measures of affect balance (Kahneman and Krueger, 2006).<sup>5</sup> This is an important reason for considering measures of affect alongside the more commonly used measures of life satisfaction when trying to identify the relative importance of various determinants.

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<sup>4</sup> Testing for the impact of culture on cross-country differences in average life satisfaction is difficult, as there is no obvious simple method for distinguishing between cultural effects due to culture and those due to some other unobserved country-specific variable. Fleche, Smith, and Sorsa (2011), use data from the World Values Survey to explore the degree to which country-specific differences in the weights attached to different drivers of well-being affect how countries are ranked in terms of average life satisfaction. They find that heterogeneity in the country-specific weightings assigned to the determinants of life satisfaction has little effect on how countries are ranked.

<sup>5</sup> The idea here is that with a measure of affect balance, which is based on the difference between the strength of feelings of positive affect and negative affect, cultural biases in reporting positive and negative affect will tend to cancel out.

***The Determinants of Subjective Well-being***

19. There is a wide literature on the determinants of subjective well-being. This paper reviews this literature using as an organising framework the 10 outcome domains that, together with subjective well-being, form the model of human well-being used in the OECD *How's Life?* report. These domains are:

- income and wealth;
- jobs and earnings;
- housing;
- health status;
- work/life balance;
- education and skills;
- social connections;
- civic engagement and governance;
- environmental quality; and
- personal security.

20. The relationship between income and life satisfaction has been the focus of extensive interest dating back to the early 1970s. There is now a general consensus with regard to the empirical relationship between income and life satisfaction on a cross-sectional basis at both the individual and cross-country level. Higher income is associated with a higher level of life satisfaction, but with diminishing returns as income increases. Sacks, Stevenson, and Wolfers (2010), for example, find a constant relationship at both the individual and cross-country level, where a doubling of income is associated with 0.3 point increase in life satisfaction on a 0 to 10 scale.

21. The static relationship between income and life satisfaction is relatively clear, as is the dynamic relationship at the individual level. There is substantial micro-evidence from lottery winners and from panel data suggesting that an increase in an individual's income results in an increase in life satisfaction (Gardener and Oswald, 2006; Di Tella, Haisken-De New, and MacCulloch, 2010). However, the evidence at the aggregate level is more ambiguous, with different views as to whether the evidence supports life satisfaction increasing in line with the log of per capita GDP (Sacks, Stevenson and Wolfers, 2010) or not (Easterlin and Angelescu, 2009). Interestingly, although there is no agreement on whether increases in average incomes will increase average life satisfaction for a country as a whole, the log-linear nature of the relationship between income and life satisfaction is generally agreed on; this in turn implies that, other things being equal, an increase in the inequality of income distribution within a country should be associated with a decrease in average levels of life satisfaction.<sup>6</sup>

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<sup>6</sup> A log linear relationship between income and subjective well-being at the individual level implies, as a point of mathematical necessity that, on average, an additional dollar of income has a greater positive impact on subjective well-being for a person with a lower income, compared to one with a higher income. Thus, increasing inequality (through the transfer of income from a person with lower income to one with

22. The relationship between jobs and life satisfaction is much less ambiguous than that between income and life satisfaction. Unemployment is associated with a large negative impact on life satisfaction at the individual level. The size of the effect is considerably larger than that due to the associated fall in income, and persists when income is controlled for separately (Winkelman and Winkelman, 1998). Evidence from panel data shows that the relationship is causal, in that unemployment causes a fall in life satisfaction, rather than a fall in subjective well-being leading people to quit their job (Lucas, Clark, Georgellis and Diener, 2004). Interestingly, it is being unemployed that has a negative impact on life satisfaction rather than having a job *per se* being associated with higher subjective well-being. Groups without a job, but that are not unemployed such as the retired, students, and full time parents, do not consistently report lower levels of life satisfaction (Blanchflower and Oswald, 2011).

23. Although housing is one of the 11 domains in *How's Life?*, there is remarkably little literature on the relationship between housing quality and life satisfaction. This is surprising given that basic information on housing tenure or size is common in household surveys, and that housing quality is commonly identified as important in the literature on quality of life. Such analysis as has been done is largely associated with the literature on ageing. Oswald, Wahl, Mollenkopf and Schilling (2009), for example, find a negative impact of renting, as opposed to owning a home, on life evaluations, and a more mixed effect associated with housing amenities and satisfaction with the home.

24. The literature on the relationship between health status and life satisfaction is extensive. Self-assessed health status has a large negative impact on life satisfaction (Dolan, Peasgood, and White 2008). This relationship holds for measures of both mental and physical health. Although information on more objective measures of health status is somewhat limited, specific conditions such as heart attacks and strokes have been shown to reduce subjective well-being (Dolan, Peasgood, and White 2008). Although there is good evidence that some of the association between good health and high life satisfaction is due to high life satisfaction causing good health (Diener and Chan, 2011), there is also a strong causal relationship running from health to life satisfaction. Lucas (2006), for example, shows that disability has a large and lasting causal impact on life satisfaction.

25. There is significant evidence on the impact of work/life balance on subjective well-being. Commuting is associated both with lower levels of life satisfaction (Frey and Stutzer, 2008) and with lower levels of affect balance (Kahneman and Kruger, 2006). Kahneman and Krueger also note that time spent caring for others has a relatively low level of net affect. This may help to explain the mixed evidence on the relationship between having children and life satisfaction. If children are associated with greater caring responsibilities, this may counter-balance the positive impact from children on a person's life. Children are associated with a stronger negative impact on subjective well-being for groups whose care burden is higher such as single parents and divorced mothers, and if the child is sick (Dolan, Peasgood, and White, 2006).

26. Most studies find a strong correlation between measures of education and skills and life satisfaction across people (OECD, 2011). The evidence is, however, mixed in studies that control for other factors. While some studies find a strong relationship between education and life satisfaction, even after controlling for other factors (Blanchflower and Oswald, 2011), others studies find that the relationship is weaker or non-existent after considering income, health, and social trust; this suggests that the effect of education on subjective well-being may be mediated by its impact on these variables (Helliwell, 2008).

27. Social connections and human contact are strongly associated with life satisfaction, and also with measures of affect balance. Living in a stable relationship has an effect on life satisfaction roughly half as large as a doubling of income (Helliwell, 2008). Other measures of social support and trust in others are

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higher income) will decrease average levels of subjective well-being overall. This result is a direct function of the logarithmic form of the functional relationship between subjective well-being and income.

also positively associated with life satisfaction (Helliwell and Wang, 2011). Time spent in the company of friends is consistently associated with higher levels of positive affect and lower levels of negative affect in time use studies (Kahneman and Kruger, 2006).

28. Civic engagement and governance is generally considered to be important to life satisfaction. Across countries, perceptions that corruption is widespread have a strong negative correlation with average life satisfaction, while measures of trust in others have a strong positive correlation (Helliwell, 2008). Frey and Stutzer (2000) find a strong relationship between the degree of democratic participation and life satisfaction in Swiss Cantons, although subsequent work has cast some doubt on the strength of this relationship (Dolan, Peasgood and White, 2006).

29. The evidence on the two remaining outcome domains from *How's Life?* is more limited than is the case for the first eight. The relationship between environmental quality and life satisfaction is poorly understood, partly due to limitations in the existing data. Environmental quality is inherently a geographic phenomenon, and integrating datasets on environmental quality with household level data on life satisfaction is costly. Nonetheless, there is some evidence that noise pollution (Weinhold, 2008) and air pollution (Dolan, Peasgood and White, 2008) have a significant negative impact on life satisfaction. Silva, Johnstone and De Keulenaer (2012) also show that subjective satisfaction with air pollution is correlated with actual air pollution.

30. Living in an unsafe or deprived area is associated with a lower level of life satisfaction after controlling for one's own income (Dolan, Peasgood, and White, 2008; Balestra and Sultan, 2012). However, it is difficult in these analyses to disentangle the effect of safety from that of other aspects of the place where people live.

31. It is important to note that the way in which different outcomes affect subjective well-being varies from outcome area to outcome area. Some outcomes vary primarily at the individual or household level. A higher income, for example, will affect the subjective well-being of the person receiving that income and probably those in their immediate family or household. However, the impact on the subjective well-being of those living near the person will be limited, and indeed, may be negative. There is good evidence that the individual benefits to subjective well-being from income are partly due to its effect on a person's rank in the income distribution rather than to the level of income *per se* (Dolan, Peasgood, and White, 2008; Clark and Senik, 2009; Barrington-Leigh, 2010). As a result, one person's higher income may have a negative impact on those living around them by increasing the 'reference point' against which people assess their own place in the income distribution. Other aspects of quality of life, however, can affect everyone in the immediate environment in a positive way. Good governance, for example, should impact on everyone within a particular polity. This implies that the determinants of subjective well-being potentially act on multiple levels (country, region, household, individual). In particular, there is clear evidence for country or regional level effects from social trust (Helliwell, 2008), civic engagement and governance (Frey and Stutzer, 2000, Helliwell, 2008), the environment (Silva, Johnstone and De Keulenaer, 2012) and safety (Dolan, Peasgood and White, 2008).

32. Table 1 below summarises the main results from the existing literature on subjective well-being on the importance of the ten domains used in *How's Life?* as possible drivers of subjective well-being. The table suggests that income, health, having a job, and social connections have a strong positive correlation with life satisfaction. Housing, work/life balance, education and skills, and government also show the expected relationship, although the evidence is more sparse for environmental quality and personal safety.

**Table 1. The Determinants of Subjective Well-being: evidence from existing research**

Domain	Author	Effect Size(0-10 scale)
Income and wealth	Stevenson and Wolfers (2008) Sacks, Stevenson and Wolfers (2010) Helliwell and Wang (2011)	0.3 (log HH income, log GDP per capita) 0.4 to 0.5 (log HH income)
Jobs and earnings	Winkelman and Winkemann (1995) Lucas, Clarke, Georgellis, and Diener (2004)	-1 (unemployment) -0.7 (immediate impact of unemployment) -0.2 (ongoing impact of unemployment)
Housing	Oswald, Wahl, Mollenkopf, and Schilling (2003)	+ (satisfaction, amenities) - (renting)
Health status	Lucas (2007)	-0.7 to -0.8 (disability) -0.25 to -1.75 (disability, GSOEP)
Work/life balance	Kahneman and Krueger (2006) Frey and Stutzer (2008)	- (time spent commuting on affect) -0.1 to -0.3 (per hour of commuting)
Education and skills	Helliwell (2008) Blanchflower and Oswald (2011)	0.1/ 0.3 (tertiary education) 0.8/0.9 (tertiary education)
Social connections	Kahneman and Krueger (2006) Helliwell and Wang (2011)	+ (time with friends, affect) 0.4/0.5 (friends to count on) 0.1/0.15 (helped stranger)
Civic engagement and governance	Frey and Stutzer (2000) Helliwell (2008)	0.1 (democratic rights) -1.4 (average aggregate perception of corruption) -0.3 (individual perception of corruption)
Environmental quality	Weinhold (2008) Silva, Johnstone and De Keulenaer (2012)	-0.15 /-0.25 (complaints about noise) - (PM10 concentrations)
Personal security	-	-

Note: actual effect sizes have been given where the coefficient is reported on a 0 to 10 or 1 to 10 scale. In all other cases only the direction of the effect is cited (either + or -)

33. This review of the literature does not tell much about the *relative effect* associated with a change in different domains.

- First, because the results listed in Table 1 come from studies based on different units of measurement, the coefficients from these studies cannot be directly compared. While it is not possible to deal with the issue of different units of measurement in an entirely satisfactory way, focusing on the results from one survey containing variables relating to as many of the outcome domains as possible goes some way towards addressing this issue. This, however, requires a large dataset containing information on a wide range of domains.
- Second, a further limitation of the existing literature is the paucity of information on the relationship between measures of affect and other aspects of quality of life. With some exceptions – largely in the area of income, work/life balance, and social connections – the existing literature provides little information on the determinants of affective well-being.

34. The rest of this paper aims to remedy these limitations by presenting results of empirical analysis based on one dataset that has both the necessary country-coverage and that includes a wide range of outcome measures, the Gallup World Poll.

### Data and Method

35. The Gallup World Poll is a large scale repeated cross sectional survey covering more than 150 countries. As of 2012, six waves of data have been collected (2005/06, 2007, 2008, 2009, 2010, 2011), although not all countries participated in all waves. The frequency of the survey is annual in most countries, and quarterly in Japan, Germany and the United States. Sample sizes are generally limited to around 1,000 respondents in each country (with a few exceptions, e.g. 2,000 for India and China). This relatively small sample size may allow comparisons across countries, but limits comparisons across population sub-groups and over time.

36. The survey is based on a common questionnaire designed with the help of some of the leading scholars in this field, and it is aimed at comparing subjective well-being behaviours and feelings of people around the world<sup>7</sup>. The core questionnaire (which is run in all participating countries) asks respondents a broad set of questions on socio-economic background, civil engagement, and satisfaction of living standard among other domains. One distinctive feature of this survey is that it combines information on both subjective well-being, and on people's self-assessments of their objective determinants. Unfortunately, several questions were not asked in all waves, but only in some waves and/or in some countries.

37. The Gallup Organization generally employs in-person interviews in developing countries and telephone surveys in developed countries where telephone coverage is at least 80% of the population. The sample is ex-ante designed to be nationally representative of the entire population aged 15 and over (including rural areas), but non-random response patterns are a likely source of ex-post bias. This issue is addressed by the post-stratification weights provided by Gallup.

38. For this paper, analysis on the determinants of life satisfaction and affect balance (Tables 3 and 4) are computed based on waves 4 and 5 (2009 and 2010 respectively) only; this is because information on the respondents' unemployment status is only available for these waves. For the second part of the paper, relating to the impact of a range of policies on subjective well-being, OECD data on these policy measures are available only up to year 2008/2009, depending on the policy variable of interest. Therefore, the analysis of the effect of policy measures on subjective well being (Tables 9 and 10) is based on waves 1 to 4 of the Gallup World Poll (2005/06, 2007, 2008, and 2009). Since, for these latter analyses, GWP data on the unemployment status of respondents is not available, the estimation distinguishes between those who had a job at the time of the survey and those who did not; results for the two groups of respondents are presented separately as robustness checks.

39. The variables selected for analysis in this paper fall into four broad groups: (i) measures of subjective well-being; (ii) demographic controls; (iii) individual well-being achievements that are proxies for the ten domains of *How's Life?*; and (iv) aggregate country averages of the latter where the plausible causal pathway for the variable to affect individual subjective well-being is associated with the characteristics of the area or society in which a person lives rather than with the individual's own

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<sup>7</sup> Among others, Nobel Prize laureate Daniel Kahneman (Eugene Higgins Professor of Psychology at the Woodrow Wilson School at Princeton University), Jeffrey D. Sachs (Director of The Earth Institute, Quetelet Professor of Sustainable Development and Professor of Health Policy and Management at Columbia University) and Angus Deaton (Dwight D. Eisenhower Professor of International Affairs, and Professor of Economics and International Affairs at the Woodrow Wilson School and Department of Economics, Princeton University).

characteristics<sup>8</sup>. In the latter part of the paper a fifth category of variables related to policy regimes is added, drawing on data from the OECD statistical database.

40. Two measures of subjective well-being are used:

- The Cantril ladder is a particular approach to measuring life evaluation that asks respondents to imagine a ladder with rungs from 0 to 10, where 10 is the best possible life for them and 0 is the worst possible life. Respondents are asked to indicate where on the ladder they would place their own life. This question is only one way to measure life satisfaction, and will be referred to as *life satisfaction* from here on.
- The measure of *affect balance* used here is somewhat more complex. It is calculated from a number of specific questions about emotions experienced on the previous day. The measure is computed as the sum of “yes” responses to questions on feeling well-rested, smiled or laughed and on having experienced enjoyment yesterday, minus the sum of “yes” responses to having experienced worry, sadness, or depression yesterday. These measures were selected out of a larger list of affect measures in the Gallup World Poll on the basis of providing the largest possible number of country/year observations while maintaining a balanced list of positive and negative measures<sup>9</sup>. Consequently, the affect balance variable is a 7 point scale ranging from -3 to 3.

41. A key limitation is that the subset of the Gallup World Poll dataset used here lacks good measures of work/life balance and housing conditions, as information on these topics is currently available only for a limited number of waves. For this reason the subsequent analysis tests only 8 of the 10 outcome domains from *How’s Life?* Descriptive data for these variables are provided in table 2.

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<sup>8</sup> Some of the variables which have been aggregated, such as social trust, could also have plausible causal pathways at the individual level. For example, an individual’s personal experiences with others might be expected to affect their trust and their level of well-being. However, much of the individual level variance in these measures will be due to the characteristics of the individual (e.g. whether they had any bad experiences; whether they have a positive disposition) rather than the characteristics of the outcome in question (i.e. how trustworthy are people on average). For this reason, only the country averages are used here for variables of this type.

<sup>9</sup> The approach used here differs slightly from other measures of affect balance such as that used by Diener, Kahneman, Tov and Arora 2010), who used two positive affect measures (enjoyment and smiling) and the average of four negative measures (anger, worry, sadness, or depression). The difference is due to the fact that Diener et al. use only one wave of the Gallup World Poll, where this paper draws on data from 5 waves.



**Table 2. Summary of the Gallup World Poll variables used in the empirical analysis**

Outcome Domain	Variable	Number of observations	Mean value	Max value	Minimum value	Standard deviation
Subjective well-being	Life satisfaction	51152	6.61	10	0	2.04
	Affect balance	51152	1.55	3	-3	1.53
Demographic characteristics	Female	51152	0.58	1	0	0.49
	Age	51152	48.58	100	15	18.27
	Age <sup>2</sup>	51152	2693.36	10000	225	1864.70
	No. Children	50769	0.52	13	0	0.92
	Born abroad	51152	0.08	1	0	0.27
	Small town	50753	0.39	1	0	0.49
	Large city	50753	0.31	1	0	0.46
	Suburb	50753	0.14	1	0	0.35
Income and Wealth	Log income <sup>(b)</sup>	50153	14.53	20.93	0	1.70
	Not enough money for food	51152	0.12	1	0	0.33
Jobs and earnings	Unemployed	50552	0.04	1	0	0.20
Health status	Health problems	51152	0.23	1	0	0.42
Education and skills	Secondary education	49777	0.62	1	0	0.49
	Tertiary education	49777	0.23	1	0	0.42
Social connections	Married	50882	0.54	1	0	0.50
	Have friends to count on	51152	0.90	1	0	0.30
	Volunteering	51152	0.23	1	0	0.42
	Aggregate average social trust <sup>(c)</sup>	35489	30.83	63.1	8.3	13.85
Civic engagement and governance	Confidence in judicial system	31191	0.51	1	0	0.50
	Afraid to express political views	31191	0.12	1	0	0.32
	Freedom to choose what you do with your life	31191	0.77	1	0	0.42
Environmental quality	Satisfaction with air quality	51152	0.79	1	0	0.41
	Satisfaction with water quality	51152	0.85	1	0	0.36
Personal security	Safe walking alone	51152	0.64	1	0	0.48
	Money or property stolen	51152	0.12	1	0	0.32

Note: The statistics refer to the sample of OECD countries in waves 4 and 5 (2009 and 2010), which is the baseline for the results presented in Table 3 and 4 (before accounting for missing values among the regressors).

All variable are coded as dummies, except: the dependent variables (*life satisfaction* and *affect balance*), *age*, *age<sup>2</sup>*, *log income*, *no. children*, and *aggregate average social trust*. The dummies take value 1 if the response to the question is *yes*, and 0 otherwise (*no*, *don't know*, *refused to answer*). For instance, *satisfaction with air quality* is coded as 1 if the respondent declares he is satisfied with the quality of air where he lives. Similarly, *small town* equals 1 if the respondent lives in a small town (as opposed to a village, large city or suburb).

<sup>(b)</sup> Base-2 logarithm of the imputed income from 2005-2007. Some of the income data was collected in monthly household income brackets in local currency and some using an open-ended question. From 2008 to present, respondents are first asked an open-ended income question and, if they say "they don't know" or refused to answer, they are asked a bracketed income item. The income data collected for each country is the median of the bracketed responses or the median of the continuous income data., This

data has then been transformed into a continuous measure by the Gallup team. Also, imputation has been used to address the high item non-response rate.

<sup>(c)</sup> Computed as the percentage of people in the respondent's country and survey wave who claim that the majority of people can be trusted.

Source: Author's analysis based on different waves of the Gallup World Poll

42. The empirical strategy in this paper follows the traditional approach for assessing subjective well-being drivers (see Frey and Stutzer, 2005; and Helliwell, 2008). Consider a well-being function:

$$U = f(D, I, X)$$

where  $U$  is a measure of the subjective well-being of each person,  $D$  is a vector of demographic variables controlling for age and gender,  $I$  captures individual circumstances that are thought to impact on an individual's subjective well-being, and  $X$  captures average differences between countries' circumstances that are thought to impact on an individual's subjective well-being. With the appropriate data the well-being function can be estimated as follows:

$$U = \alpha D + \beta I + \gamma X + \varepsilon$$

43. The information for  $D$ ,  $I$  and  $X$  are drawn from the Gallup World Poll. Two measures of subjective well-being are used, capturing the evaluative and affective aspects of subjective well-being respectively. The analysis is done using ordinary least squares with country and wave fixed effects, in line with Helliwell (2008). The post stratification weights provided by Gallup are used to address sample selection bias and assign weights based on the observed characteristics of the Gallup sample compared to the population as a whole. Given the ordinal nature of measures of subjective well-being, ordinary least squares estimates are theoretically inefficient when compared to methods designed to deal with ordinal data such as Probit<sup>10</sup>. For the sake of completeness, the analysis was hence also conducted by estimating the analogous Probit model, (for affect balance, a slightly different dependent variable was used, being equal to one where the sum of positive effects was greater than the sum of negative effects). Since the associated marginal effects were very close to the OLS estimated coefficients (with the same sign and significance, and very similar magnitude), the description of results provided below is based on the OLS analysis, whose interpretation is more straightforward.

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<sup>10</sup> Ferrer-i-Carbonell and Frijters (2004) who investigated this issue in more detail, conclude that, in practice, there is little difference between least squares estimates of subjective well-being functions and theoretically preferable methodologies such as probit.

## Empirical Estimates

### *Life Satisfaction*

44. Table 3 shows the results of a series of regressions with life satisfaction as the dependent variable, and covering all 34 OECD countries. Results from three models are reported in the table: model (1) includes only demographic variables and those that can be measured objectively<sup>11</sup>, while models (2) adds more subjective variables and model (3) variables relating to the country rather than the individual. The size of the coefficient can be interpreted as the average increase in life satisfaction, on a 0 to 10 scale, associated with a change of one in the independent variable.

45. Regression (1) confirms what has been found elsewhere with respect to the key demographic variables (Dolan, Peasgood and White, 2008). Life satisfaction in OECD countries is ‘u-shaped’ in age, with a minimum occurring in the mid-50s. There is a positive effect associated with being female, and a negative one associated with being a migrant. In regression (1), the coefficient for female is relatively large compared to what has been found elsewhere, but the negative coefficient on migrant status is in line with previous research. Finally, there is a very small negative coefficient on the number of children, a result which is consistent with other findings (Dolan, Peasgood, and White, 2007).

46. The variables referring to other well-being dimensions in model 1 also show the expected pattern. Income is highly significant, with a doubling of income associated with an increase of nearly 0.2 points in life satisfaction. This coefficient is somewhat smaller than the coefficient found by Wolfers and Stephenson (2008), but this may be partly accounted for by the inclusion of variable referring to ‘not having enough money to buy food’, unemployment and education (all variables strongly correlated with income) as independent variables in model (1).<sup>12</sup> Unemployment has the expected large negative coefficient, and is strongly significant. Education too has a relatively large effect in model (1), as does being married.

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<sup>11</sup> As all the variables included in the analysis are self reports the distinction between objective and subjective measures is, to some extent, arbitrary. For the purposes of this analysis an ‘objective’ variable is one where a third party could, with access to the right information, answer the question and expect to produce the same answer as the respondent. Subjective variables are those where a third party would not necessarily reach the same judgement as the respondent. For example, with access to a person’s tax records and pay slips, a person could, in principle, calculate the respondent’s income. However, even knowing that a respondent has a particular medical condition, it will not always be possible for a third party to know whether the respondent would categorise this as comprising a “health problem”.

<sup>12</sup> Wolfers and Stephenson (2008) look at the un-mediated impact of income on life satisfaction, and do not control for other factors such as unemployment or education in their estimates. The inclusion of these additional variables in Table 3 means that the coefficient on income captures only the independent effect of income, controlling for potentially confounding factors such as unemployment; this will lead to smaller coefficients on income than in the case where other income-related variables are excluded.

**Table 3. Regression results: life satisfaction**

Outcome Domain	Independent Variable	(1)	(2)	(3)
Demographics	Female	0.2857***	0.3490***	0.0892*
	Age	-0.0830***	-0.0628***	-0.0528***
	Age <sup>2</sup>	0.0008***	0.0006***	0.0004***
	No. Children	-0.0566**	-0.0267	-0.0397
	Born abroad	-0.4232***	-0.2997***	-0.2855***
	Small town	-0.0177	0.0369	0.0900
	Large city	-0.0939	0.0399	0.1870**
	Suburb	-0.1181	-0.0280	0.2904***
Income and wealth	Log household income	0.1844***	0.1287***	0.1482***
	Not enough money for food		-0.8568***	-0.9226***
Jobs and earnings	Unemployment	-1.0288***	-0.8120***	-0.4643***
Housing conditions	-			
Health status	Health problems		-0.5661***	-0.4623***
Work-life balance	-			
Education and skills	Secondary education	0.4049***	0.2653***	0.2145**
	Tertiary education	0.8144***	0.5119***	0.4396***
Social connections	Married	0.3762***	0.2793***	0.2584***
	Have friends to count on		0.8841***	0.7670***
	Volunteering		0.3364***	0.3763***
	Aggregate average social trust			0.0453***
Civic engagement and governance	Confidence in judicial system			0.1602***
	Afraid to express political views			-0.0556
	Freedom to choose what you do with your life			0.4109***
Environmental quality	Satisfaction with air quality		0.1140**	0.1253**
	Satisfaction with water quality		0.2180***	-0.0337
Personal security	Safe walking alone		0.2506***	0.1666***
	Money or property stolen		-0.1175*	-0.1482**
	Observations	47452	47452	12701
	r <sup>2</sup>	0.169	0.241	0.346

Notes: Linear regression, weighted, on a stratified sample. Life satisfaction as measured with the Cantril ladder. Constant term, country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on different waves of the Gallup World Poll

47. The results of model (1) are well in line with previous research, but they do not provide a complete picture of the relationship between life satisfaction and many other relevant well-being achievements. For this it is necessary to include a range of more subjective variables that are a proxy of

other aspects of well-being, such as health status, social connections, civic engagement and governance, environmental quality and personal security. On the whole, model (2) confirms the direction and relative sizes of those variables included in model (1). However, the absolute magnitude of the coefficients on being female, income, unemployment and education is reduced. This effect is particularly strong for the education variables, lending support to the hypothesis that education affects life satisfaction primarily through its impact on other aspects of well-being.

48. Model (2) strongly supports the relevance of health and social connections to life satisfaction. Health problems are associated with a large negative coefficient, while having friends to count on and volunteering are associated with large positive coefficients. Model (2) also sheds some light on the relationship between personal safety and life satisfaction, with a sizeable positive coefficient associated with the variable ‘feeling safe walking at night in the local neighbourhood’ and a significant negative coefficient associated with ‘having money or property stolen during the last year’. This finding is of interest since it suggests that the actual experience of criminal victimisation has a negative impact on subjective well-being well beyond the immediate time of the incident in question. Model (2) also highlights the expected positive relationship between subjective perceptions of environmental quality and life satisfaction<sup>13</sup>.

49. The last column of table 3 contains the results of the full regression, adding to objective and subjective individual variables also measures relating to the civic engagement and governance. The inclusion of these variables, unsurprisingly, reduces the size of most of the coefficients when compared to model (2). However, with a few exceptions, the overall picture does not change much. The most notable impact is that the coefficient on being female drops to near 0 and almost loses significance. The variables associated with urbanisation are significant only under model (3), with sizable positive coefficients associated with ‘living in a large city’ or ‘living in the suburbs’. Also, satisfaction with water quality loses significance. The precise interpretation of these changes is difficult, but they have relatively little impact on the overall picture.

50. The variables added in model (3) shed further light on the determinants of subjective well-being. Confidence in the judicial system is highly significant, as is freedom to choose what to do with your life and both have the expected positive coefficient. Average aggregate social trust is also highly significant and positively correlated with life satisfaction<sup>14</sup>.

51. However, even model 3 explains only a third of the variance in life satisfaction between individuals. This, however, should not be viewed as evidence of an inadequate model, as several studies suggest that about a third of total variance in life satisfaction is driven by stable differences in individual traits and personality (Lucas and Donnellan, 2007), leaving potentially two thirds to be explained by changes in life circumstances. The model estimated here, therefore, accounts for perhaps half of the non-personality related variance in life satisfaction at the individual level.

52. Comparing the regression coefficients of different variables gives a general impression as to the relationship between various aspects of quality of life and life satisfaction. However, it is difficult to interpret what the coefficients mean in reality- i.e. how big is a coefficient of 0.2? One way to approach

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<sup>13</sup> Silva, Johnstone and De Keulenaer (2011) also show that subjective perceptions of air quality correlate well with actual PM10 concentrations, which supports the finding in this paper.

<sup>14</sup> The coefficient of ‘trust in others’ appears relatively small compared to those for other variables because of the way the variable is built. Indeed average trust reports the percentage of the population reporting most people can be trusted. The coefficient thus captures the impact of a 1 percentage point change in the proportion of people believing most people can be trusted. This indicates that the magnitude of the impact is actually relatively large.

this issue is to use the impact of a given change in income as a basis for comparison. Most people can readily comprehend what is meant by income doubling and, within some limits, they can imagine what the effect might be on their own subjective well-being. Because the income measure used for analysis in this article is the base two logarithm of income, the coefficient on income in Table 3 gives the impact of doubling income on life satisfaction. Table 4 is constructed by dividing the coefficients for each variable by the coefficient on income, giving the magnitude of a one unit change in each outcome compared to a doubling of household income<sup>15</sup>. Thus, a value of 1 indicates that a one unit change in the variable in question has an equivalently sized relationship with life satisfaction to a doubling of income, and a value of 3 indicates that a one unit change in the variable considered is equivalent to an eight-fold increase in income (income doubling three times in a row).

**Table 4. Relative effect sizes of different variables on satisfaction**

Independent Variable	Coefficient size relative to income
Female	0.6*
Age	0.4***
Age <sup>2</sup>	
No. Children	-0.3
Born abroad	1.9***
Small town	0.6
Large city	1.3**
Suburb	2.0***
Log HH income	1.0***
Not enough money for food	6.2***
Unemployment	3.1***
Health problems	3.1***
Secondary education	1.5**
Tertiary education	3.0***
Married	1.7***
Have friends to count on	5.2***
Volunteering	2.5***
Aggregate average social trust	0.3***
Confidence in judicial system	1.1***
Afraid to express political views	-0.4
Freedom to choose what you do with your life	2.8***
Satisfaction with air quality	0.8**
Satisfaction with water quality	-0.2
Safe walking alone	1.1***
Money or property stolen	1.0**

Note: Stars denote the significance of the variable in regression model (3): \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on different waves of the Gallup World Poll

53. Table 4 illustrates clearly that the relative magnitude of the non-income determinants of life satisfaction is large. Based on table 4, not being unemployed and not having health problems are associated with a change in life satisfaction roughly equivalent to an eight-fold increase in income. Having friends to count on has an even larger impact. The estimates in table 4 may over-estimate the impact of non-income determinants of life satisfaction, as the income coefficient in model 3 captures only the “pure” effect of a change in income on life satisfaction. In practice, an increase in income may have consequences for a

<sup>15</sup> Refer to table 4 for variable definitions.

person's health status, where they live, and for many other aspects of life, which also affect life satisfaction. Thus the net impact of income on life satisfaction may be larger than that given by the coefficient in model (3). This indirect effect, however, is unlikely to be large enough to change the main conclusions about the relative sizes of the impact on life satisfaction of different aspects of quality of life presented in Table 4.

54. Taken as a whole, the evidence in Tables 3 and 4 largely supports the validity of the outcome domains identified in *How's Life?* and in other well-being frameworks. The vast majority of the variables measuring well-being outcomes are significant, and all of these estimates have the expected sign. More importantly, the only outcome variables that are not significant refer to domains where the Gallup World Poll provides multiple indicators such as social connections and environmental quality. In both cases, the other variables for that domain are significant, suggesting that the issue is one of 'over-measurement' of the domain in question (too many proxies for the same underlying concept) rather than the non-existence of a relationship between the domain in question and subjective well-being.

### *Affect Balance*

55. While life satisfaction is the measure most commonly used to investigate the influence of quality of life factors on subjective well-being, there are good reasons to look at measures of affect as well. There are two reasons for this. First, conclusions that can be reached about the relationship between subjective well-being and quality of life can be regarded as more robust if they are not sensitive to the particular measure used. Second, looking at affect balance may help shed light on different sorts of issue. Affect, for example, might be more sensitive to how people use their time, while life satisfaction might provide more information on areas where comparisons with others play an important role. Another reason for looking at affect is provided by Kahneman and Krueger (2006), who argue that measures of affect balance may be less subject to individual reporting biases than life satisfaction measures.

56. Table 5 repeats the same regressions as in Table 3, using affect balance rather than life satisfaction as the dependent variable. Qualitatively the results are very similar to those for life satisfaction, with almost all significant variables having the same sign in both Tables 3 and 5. In addition, the same basic pattern of declining coefficient sizes for income, unemployment, and education is observable as subjective and country-aggregate variables are added. There is one major exception to the similar qualitative findings for affect balance and life satisfaction. Where being female is associated with higher levels of life satisfaction, it is associated with lower levels of affect balance. Given the consistency in terms of the sign on other coefficients, this raises some intriguing, but difficult to answer, questions about the different gender responses to alternative measures of subjective well-being. One possibility is that women are more willing to report more extreme responses than men, which would be consistent with a higher average score on life satisfaction (with more women scoring highly overall due to the general rightward skew of the life satisfaction data distribution) but a lower affect balance (with women reporting both more positive and more negative emotions).

**Table 5. Regression results: affect balance**

Outcome Domain	Independent Variable	(4)	(5)	(6)
Demographics	Female	-0.1005***	-0.0345	-0.0501
	Age	-0.0532***	-0.0354***	-0.0349***
	Age <sup>2</sup>	0.0005***	0.0003***	0.0003***
	No. Children	-0.0666***	-0.0429**	-0.0738***
	Born abroad	-0.2405***	-0.1384**	-0.2633***
	Small town	0.0246	0.0711*	0.1017*
	Large city	-0.0386	0.0929**	0.0782
	Suburb	-0.0575	0.0275	0.1810**
Income and wealth	Log HH income	0.0956***	0.0493***	0.0427***
	Not enough money for food		-0.6091***	-0.4544***
Jobs and earnings	Unemployment	-0.4642***	-0.2912***	-0.1799**
Health status	Health problems		-0.6297***	-0.5829***
Education and skills	Secondary education	0.1403***	0.0262	0.1661***
	Tertiary education	0.2449***	-0.0055	0.1192*
Social connections	Married	0.2362***	0.1481***	0.1625***
	Have friends to count on		0.7492***	0.6955***
	Volunteering		0.1775***	0.0616
	Aggregate average social trust			0.0077***
Civic engagement and governance	Confidence in judicial system			0.0967**
	Afraid to express political views			0.0133
	Freedom to choose what you do with your life			0.5238***
Environmental quality	Satisfaction with air quality		0.1726***	0.1236***
	Satisfaction with water quality		0.2351***	-0.0190
Personal security	Safe walking alone		0.2615***	0.2346***
	Money or property stolen		-0.2101***	-0.1859***
	Observations	47794	47794	12792
	r <sup>2</sup>	0.064	0.170	0.188

Note: Linear regression, weighted, on a stratified sample. Constant term, country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

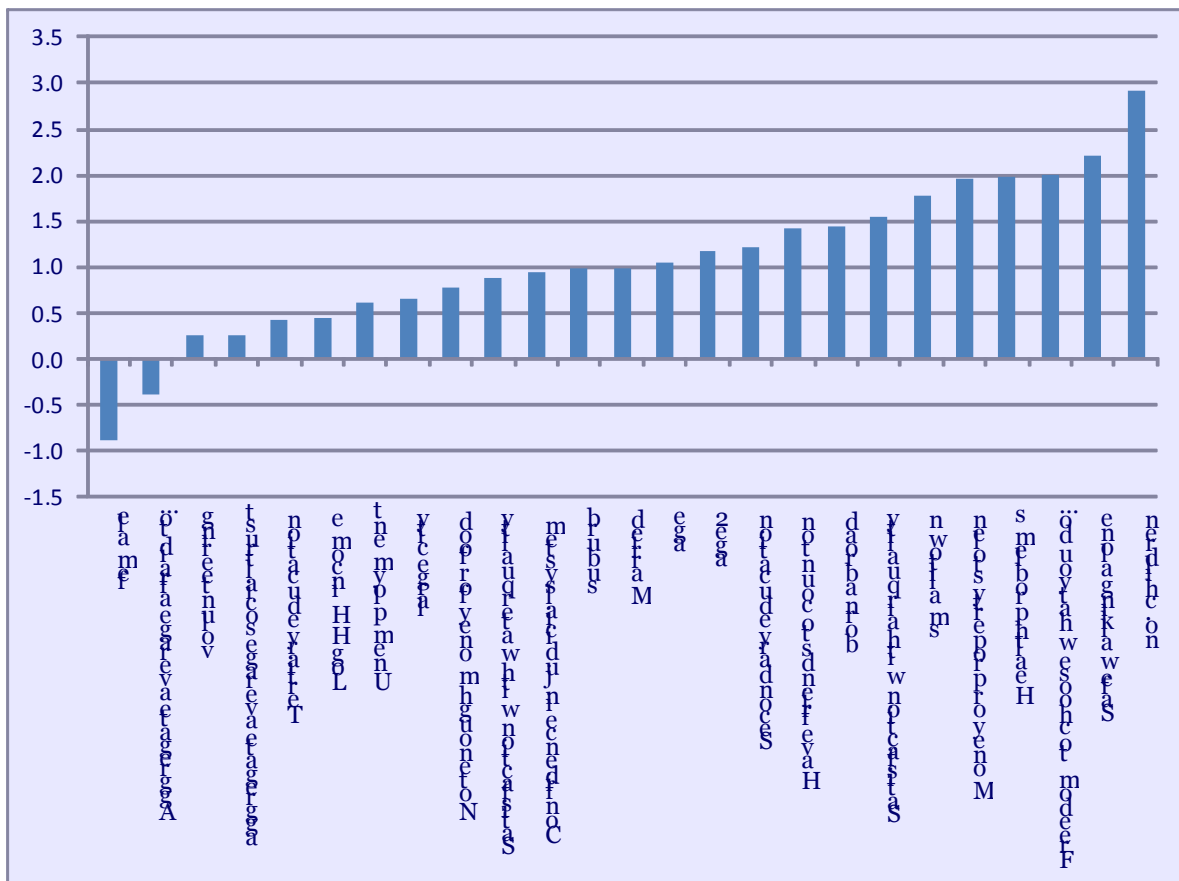
Source: Author's analysis based on different waves of the Gallup World Poll

57. Because the affect balance variable used here is measured on a 7 point scale, as opposed to the 11 point scale used for life satisfaction, it is not possible to directly compare the relative sizes of the coefficients between Tables 3 and 5. To get a clearer perspective on the relative size of the affect balance coefficients compared to those for life satisfaction it is necessary to re-scale the coefficients. Figure 1 rescales the coefficients from model (6) to be comparable with those in model (3), and then divides the



coefficients from model (6) through by the corresponding coefficient from model (3)<sup>16</sup>. The result is a number indicating the relative size of the coefficient for affect balance compared to that obtained for life satisfaction, with a value of 1 indicating that the adjusted coefficient is equal for life satisfaction and for affect balance; higher and lower values respectively indicate a greater and lesser impact of the variable in question on affect balance than on life satisfaction.

Figure 1. Relative effect sizes: life satisfaction and affect balance



Note: Standardised coefficients are based on those reported for model (6) in Table 5 and model (3) in Table 3; the coefficients for model (6) are multiplied by 11/7 to adjust for different scale lengths. \* indicates the variable was significant at p<0.1 or better in both model (6) and (3).

Source: Author’s analysis based on different waves of the Gallup World Poll

58. Figure 1 shows that being a woman and aggregate fears to express political views are the only variables for which there are differences in the sign of the coefficients depending on the subjective well-being variable considered. All other variables have the same sign. However, there are some relatively large differences in the relative size of the coefficients. A given change in income, for example, has only 40 percent of the impact on affect balance than it has on life satisfaction. Among the other coefficients, aggregate average social trust, and having a tertiary education all have a smaller impact on affect balance than they do on life satisfaction. Although the reduction in impact is not as great as is the case for income or social trust, unemployment also has a smaller impact on affect balance than it does on life satisfaction.

<sup>16</sup> Re-scaling is necessary to because life satisfaction is measured on an 11 point scale and affect on a 7 point scale. The re-scaling is accomplished simply by multiplying the affect coefficients by 11/7.

Conversely, health problems, freedom to choose what to do with your life, feeling safe when walking alone, and criminal victimisation all have a larger impact on affect balance than on life satisfaction. Overall, items relating to health status, personal security, and freedom to choose what to do with one's life appear to have a larger impact on affect balance when compared to life satisfaction, while economic factors such as income and unemployment have a smaller impact.

59. Some of the explanations behind the differences between the estimated coefficients on affect balance and life satisfaction are simple. Since life satisfaction measures capture the evaluative aspect of subjective well-being, areas where people compare themselves to others – such as income and employment status – have a larger impact on life satisfaction than on affect balance. Other factors, such as volunteering, may have a bigger impact on life satisfaction than on affect balance because, although they make a person feel more satisfied with their life, this may also be associated with dealing with negative situations or with performing additional work.

60. Similarly, factors such as health problems might be expected to have a larger impact on affect balance than on life satisfaction. While having a health problem may not overly influence the degree to which a person views their life as successful, any significant health problem certainly has the potential to make someone experience more negative feelings on a day to day basis. In general, the results in Figure 1 are consistent with other analyses of the differences between the drivers of life evaluation and of affect (Diener, Kahneman, Tov and Arora, 2010).

### ***Subjective well-being across different groups of the population***

61. The estimates in Tables 3 and 5 implicitly assume that the structure of the relationship between subjective well-being and its various determinates is similar for different sub-groups of the population. In particular, while Tables 3 and 5 allow for women and different age groups to have higher or lower average scores than other population groups, they do not allow for the fact that different groups might have fundamentally different subjective well-being functions. Tables 6 and 7 repeat the regressions run in Tables 3 and 5 for specific sub-groups of the population. In particular, Table 6 shows regression models for men (7), women (8), the elderly (9), people of working age (10) and youths (11), with life satisfaction as the dependent variable.

62. A comparison of regressions (7) and (8) suggests that the determinants of life satisfaction are largely the same for men and women. There are only few areas where the coefficients differ by a large amount, and in several cases (e.g. air quality, safety, money or property stolen) this is associated with one variable not being significant for one gender or the other. The most significant differences are for unemployment and health status, where the coefficient is larger for women than men. However, for all of the domains for which there is evidence of a strong overall relationship between that outcome and subjective well-being - income and wealth, jobs and earnings, health, and social connections – the results show the same sign and significance.

**Table 6. Regression results: life satisfaction among different population sub-groups**

Outcome Domain	Independent Variable	Men (7)	Women (8)	Aged (9)	People of Working Age (10)	Youths (11)
Demographics	Female	-	-	-0.0106	0.1789***	-0.0272
	Age	-0.0561***	-0.0482***	-0.1140	-0.0895***	-0.2441*
	Age <sup>2</sup>	0.0004***	0.0004***	0.0008	0.0009***	0.0045
	No. Children	-0.0257	-0.0424	0.1454	-0.0316	-0.0983*
	Born abroad	-0.2729**	-.2740**	0.0423	-0.3099***	-0.4361**
	Small town	0.0925	0.0880	0.1466	-0.0097	0.3140*
	Large city	0.2227*	0.1520	0.0845	0.1823*	0.2435
	Suburb	0.0967	0.4556***	0.2839	0.2899***	0.3579
Income and wealth	Log HH income	0.1480***	0.1484***	0.0912**	0.1754***	0.1012***
	Not enough money for food	-0.9389***	-0.9098***	-0.8108***	-0.8665***	-0.9888***
Jobs and earnings	Unemployment	-0.3731**	-0.5757***	-0.4469	-0.6547***	-0.0834
Health status	Health problems	-0.3771***	-0.5371***	-0.5242***	-0.4590***	-0.3238**
Education and skills	Secondary education	0.2106	0.2313**	0.6146***	0.2861**	-0.0461
	Tertiary education	0.4544***	0.4502***	0.8516***	0.4909***	0.2339
Social connections	Married	0.2366***	0.2717**	0.1283	0.2850***	0.3003**
	Have friends to count on	0.7512***	0.7708***	0.5410***	0.7881***	0.9902***
	Volunteering	0.4081***	0.3380***	0.0992	0.3537***	0.4778***
	Aggregate average social trust	0.0388***	0.0510***	0.0142**	0.0463***	0.0259***
Civic engagement and governance	Confidence in judicial system	0.0956	0.2255***	-0.0334	0.1649***	0.2998***
	Afraid to express political views	-0.0741	-0.0320	0.0464	-0.1035	0.0227
	Freedom to choose what you do with your life	0.4606***	0.3640***	0.3036*	0.3218***	0.5627***
Environmental quality	Satisfaction with air quality	0.0829	0.1564**	0.1224	0.1623**	0.0837
	Satisfaction with water quality	0.0733	-0.1191	0.1024	-0.0604	0.0282
Personal security	Safe walking alone	0.2837***	0.1012	0.1581	0.1788**	0.1532
	Money or property stolen	-0.0844	-0.1899**	-0.2068	-0.1285	-0.1217
	Observations	5,329	7,372	2,596	7,893	2,212
	r <sup>2</sup>	0.330	0.365	0.376	0.383	0.235

Note: Old-age is 65 years and older; working age is 31 to 64 years old; youth is 15 to 30 years old. Linear regression, weighted, on a stratified sample. Constant term, country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on different waves of the Gallup World Poll

63. By way of contrast, there are significant differences in the coefficients across regressions (9), (10) and (11). Income and being unemployed have a larger effect on life satisfaction for the working age population than for the older and younger age groups. This is likely associated with this group's greater labour market engagement, and to the fact that working age people are more likely to have dependent family members to care about. The importance of health problems for life satisfaction increases monotonically with age, while the importance of social connections (with the exception of generalised trust) decreases with age. Education appears to be a particularly powerful predictor of the life satisfaction of the older population, which suggests that education may act as a proxy for the cumulative impacts of a range of factors over the life course. Conversely, the education variables are not significant for youth, perhaps reflecting that a large proportion of this age group is still engaged in education.

64. Table 7 repeats the analysis from Table 6 but with affect balance as the dependent variable. The picture that emerges here is rather different, however, to that in Table 6. There are a number of differences in the strength of different factors impacting on affect balance for men and women. Children have a significant negative impact on the affect balance for men, but not for women, while marriage has a large positive coefficient for males, compared to a small – and only marginally significant – coefficient for females. Income has a smaller coefficient on the affect balance for women than for men, and is only marginally significant. However, unemployment has a much stronger negative impact for women.

65. While there are some noticeable differences between the results for life satisfaction and for affect balance between men and women, the general pattern of results is relatively similar to what was found for life satisfaction when analysed by age. Income remains more important for the working aged group, while the importance of health increases with age. Although the picture is not as clear as is the case for life satisfaction, social contact remains more important for youths than for older age groups.

Table 7. Regression results: affect balance for different population sub-groups

Outcome Domain	Independent Variable	Men (12)	Women (13)	Elderly (14)	People of working age (15)	Younths (16)
Demographics	Female			-0.1527*	0.0286	-0.1400*
	Age	-0.0488***	-0.0214***	-0.0851	-0.0518*	-0.0005
	Age <sup>2</sup>	0.0004***	0.0002**	0.0005	0.0005*	-0.0008
	No. Children	-0.1163***	-0.0333	0.0674	-0.0701**	-0.0186
	Born abroad	-0.2843**	-0.2219**	-0.0413	-0.2477***	-0.5147***
	Small town	0.1702**	0.0295	0.1153	0.1031	0.0446
	Large city	0.0643	0.0777	0.0958	0.1139	-0.0611
	Suburb	0.1542	0.1920*	0.2052	0.1987**	0.1183
Income and wealth	Log HH income	0.0562***	0.0289*	0.0351	0.0413**	0.0446*
	Not enough money for food	-0.3186***	-0.5573***	-0.3934**	-0.5549***	-0.1788*
Jobs and earnings	Unemployment	-0.0073	-0.3743***	-0.2551	-0.1478	-0.1213
Health status	Health problems	-0.5610***	-0.6145***	-0.7983***	-0.5514***	-0.3571***
Education and skills	Secondary education	0.2295***	0.1094	0.2898***	0.2216**	0.0149
	Tertiary education	0.2301**	0.0082	0.1093	0.1475	0.1846
Social connections	Married	0.2415***	0.0987*	0.2098**	0.1665***	0.0987
	Have friends to count on	0.6243***	0.7675***	0.6723***	0.6719***	0.8568***
	Volunteering	0.0116	0.1053*	-0.1021	0.0123	0.1871**
	Aggregate average social trust	0.0015	0.0134***	-0.0022	0.0068***	0.0004
Civic engagement and governance	Confidence in judicial system	0.0490	0.1383***	0.0288	0.1225**	0.1394*
	Afraid to express political views	0.0414	-0.0213	0.1210	-0.0625	0.1270
	Freedom to choose what you do with your life	0.5434***	0.5018***	0.6137***	0.5148***	0.4453***
Environmental quality	Satisfaction with air quality	0.0678	0.1740***	0.2564**	0.1188**	0.1194
	Satisfaction with water quality	-0.0302	-0.0297	-0.0215	-0.0178	-0.0114
Personal security	Safe walking alone	0.2542***	0.2321***	0.3230***	0.1814***	0.2798***
	Money or property stolen	-0.2037***	-0.1685**	-0.1297	-0.1854***	-0.1883*
	Observations	5,362	7,430	2,631	7,938	2,223
	r <sup>2</sup>	0.184	0.200	0.260	0.178	0.166

Note: Old-age is 65 years and older; working age is 31 to 64 years old; youth is 15 to 30 years old. Linear regression, weighted, on a stratified sample. Constant term, country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on different waves of the Gallup World Poll

*The impact on subjective well-being of selected policies*

66. The analysis of the relationship between various well-being outcomes and subjective well-being can inform on the drivers of well-being, which is a potentially useful first step in identifying policies that can enhance people's lives. A key question, therefore, is whether, and to what extent, specific policy interventions can be shown to have demonstrable effects on subjective well-being data.

67. At one level, the relationships identified in the preceding parts of this paper would seem to imply that a policy that improves the situation in any particular well-being domain should also improve subjective well-being. For example, if a piece of employment protection legislation improves work/life balance, it might be expected that it will also enhance subjective well-being. However, the regressions in the earlier part of this paper indicate correlations in a cross-sectional dataset, and cannot be taken to demonstrate causality.<sup>17</sup> Further, policy interventions might impact only partly on the desired outcome. Often, a particular policy intervention will involve trade-offs between conflicting goals, improving some while at the same time worsening others. For example, some types of employment protection legislation, such as those protecting mothers of young children, might be expected to improve the work/life balance of working mothers, but may also erode the employment prospects of the affected workers and therefore increase of unemployment and lower life satisfaction as a result. Hence the net impact of a policy intervention is not necessarily clear.

68. Compared to the large literature on the determinants of subjective well-being, there is much less information on whether policy can affect subjective well-being. The existing literature in this area (e.g. Greve et al; 2010) takes a largely descriptive approach, or focuses on the application of subjective well-being data to cost-benefit analysis (Dolan and White, 2007; Dolan and Metcalfe, 2008), rather than on exploring whether policy can affect subjective well-being. This reflects the fact that the measured impact of a policy on subjective well-being is likely to be small relative to natural variability in the data, requiring a large dataset which collects information over time.

69. Despite these difficulties, it is possible to test whether specific policy interventions affect subjective well-being measures. One possibility is to take a quasi-experimental approach based on micro-data that follow the same person over time, to test whether a specific policy reform leads to changes in the subjective well-being of the group of people most affected by it. This is the approach taken by Chapple and D'Addio (forthcoming), with respect to a number of social policies interventions including changes to pension eligibility and parental leave provisions.

70. An alternative to the quasi-experimental micro-data approach is to use a sufficiently large cross-country and cross-sectional survey, and to combine this with a dataset of policy variables with observations for each variable and for each country/wave. In contrast to the method adopted by Chapple and D'Addio, this approach has the advantage of not relying on the existence of a convenient natural experiment. By drawing on observations over a wide range of years and across a wide range of countries, more observations are available; it is thus potentially possible to look at any issue for which a time series of a specific policy parameter can be found covering the relevant countries. On the other hand, a cross-country approach is at greater risk of confounding factors affecting the results, and is thus potentially less robust than a quasi-experimental approach. The Gallup World Poll provides a suitable cross-country panel, and some of the OECD policy databases provide some of the relevant policy indicators. Under this approach,

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<sup>17</sup> In fact, although the regressions included in this paper are cross-sectional, a number of studies based on panel micro-data do demonstrate causal effects from the same outcomes considered here on various measures of subjective well-being. Some of these studies are mentioned earlier in the first section of the paper.

the policy variables are entered as a sub-set of independent variables in the same regression model estimated in models (1) to (3).

71. Three policy variables were selected for this analysis. These variables were selected based on the criteria of having good coverage for the relevant countries over the time period covered by the Gallup World Poll, and because the way in which these variables could be expected to impact on subjective well-being is relatively straight forward. The three country-level policy variables considered here are:

- The unemployment replacement rate (replacement) captures the average unemployment benefit (net of income taxes) available to a worker over a 60 month period following the loss of their job, expressed as a proportion of their earnings. The replacement rate used is the overall average (averaging across different family types), including both unemployment insurance and unemployment assistance.<sup>18</sup> For a given income, one would expect a higher replacement to increase a person sense of well-being, by reducing uncertainty about material conditions in the event of a job loss, although the effect may be partially or fully offset by higher aggregate unemployment.
- The mean household out-of-pocket health expenditure for a country (health co-payments). This variable relates to the average level of health co-payments required when accessing health services in a particular country: it represents the household's mean out-of-pocket expenditure for health (expressed in \$US at PPP, 2000). All other things being equal, one would expect higher health co-payments to be associated with a negative impact on subjective well-being reflecting decreased access to health services.
- An index of the strength employment protection legislation (epi). This is an index of the overall strictness of employment protection legislation in a country at a particular point in time. The index, which is taken from the *OECD Employment Outlook*, attaches scores to different aspects of the labour market legal framework such as whether dismissal of a worker requires a written statement from the employer, the length of the delay until the start of notice for the employee who is being dismissed, requirements for severance pay, the need for special grounds for dismissal and so forth. The overall index is comprised of three sub-indices relating to workers on permanent contracts, workers on temporary contracts, and rules around collective dismissal. One would expect that this index would be associated with a positive impact on subjective well-being for those in work, but have a weaker relationship for those outside the labour-market and possibly a negative relationship for the unemployed (who may be excluded from work by less flexible labour market policy).
- Finally, the aggregate unemployment rate is included since one side-effect of the two labour market policy variables considered is the potential for higher unemployment rates due to a less flexible labour market. Including the unemployment rate allows this effect to be controlled for.<sup>19</sup> Table 8 presents the descriptive statistics of these policy variables.

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<sup>18</sup> The data refer to the OECD series: *Net replacement rates (NRR) over a five-year period following unemployment, 2001-2009*; as available in OECD (2011).

<sup>19</sup> While health co-payments will also have behavioural effects, these are less obvious than is the case for labour market policy and there is no obvious variable that can be included to control for them.

**Table 8. Descriptive statistics for the policy variables included in the analysis**

Variable	obs.	Mean	max	min	sd
Replacement	53850	55.8	76	9	17.6
Unemployment	53850	6.7	18.1	2.6	2.9
Health co-payments	32562	561.6	1458	214	257.6
Epl	37206	2.0	3.5	0.6	0.7

Note: statistics computed on the estimation sample of column 1, Table 9 (which is the larger estimation sample, including as sub-samples all other results in Table 9 and 10).

Source: Author's analysis based on OECD.Stat

72. Table 9 below reports the results of a regression including country-level policy variables. The dependent variable is life satisfaction, while the independent variables include controls for the demographic and socio-economic status of individuals as well as the aggregate unemployment rate and the net replacement rate over a 60 months period following unemployment. Broadly speaking the core of the regression is the same as in regression (1) earlier in the paper, except for that individual unemployment status which is not available for the waves in use. The aggregate unemployment rate is added as described above in paragraph 71.

73. Regression (17) shows that the control variables have a largely similar relationship to life satisfaction as that illustrated in regression (1). The unemployment rate has a negative and significant coefficient, with a 1 percentage point increase in the unemployment rate associated with a fall in average life satisfaction of just less than 0.1 points (the direction and significance is line with Di Tella, MacCulloch and Oswald, 2003). The unemployment replacement rate is also highly significant, with a small positive coefficient. This indicates that a higher replacement rate for unemployment is, all other things equal, associated with higher life satisfaction. More specifically, a 1 percentage point increase in the replacement rate is associated with an average increase in life satisfaction of approximately 0.05 points. Although this is a small effect, it is of interest that the effect is detectable at all, given the range of confounding factors and the fact that only a portion of all respondents are potentially affected by it.

74. One possible interpretation of the positive effect of the net replacement rate for unemployment on life satisfaction in model (17) is that it is simply the result of omitted variables. In other words, it is possible that there is another, unmeasured factor that varies across countries and years and that drives the effect measured. One way of further probing what drives the effect of net replacement rate is to re-run the regression separately for those with jobs and those not working. (Models (18) and (19) in Table 9). The main interest in these analyses is the effect of the social "safety net" on those who currently have jobs (model 18). The results of model (19) are more difficult to interpret because the group "people not working" includes retirees, those in full-time education and those opting-out of the labour force, in addition to those who are unemployed but actively seeking work.



**Table 9. Regression results: effects of unemployment replacement rates on life satisfaction**

Independent Variable	(17)	(18)	(19)	(20)	(21)
	All sample	People working	People not working	Aged	People of working age
Female	0.2308***	0.2388***	0.2728***	0.1595*	0.2227***
Married	0.4233***	0.3679***	0.4836***	0.1310	0.5331***
Age	-0.0811***	-0.0641***	-0.1044***	-0.0248	-0.1263***
Age squared	0.0008***	0.0006***	0.0010***	0.0002	0.0013***
Log income	0.2600***	0.2539***	0.2358***	0.2528***	0.2607***
Secondary education	0.3708***	0.4092***	0.3454***	0.3562***	0.3603***
Tertiary education	0.6470***	0.6722***	0.6453***	0.5037***	0.7042***
No. Of children	-0.0601***	-0.0421*	-0.0782**	-0.2263	-0.0319
Rural	0.0777	0.0706	0.0904	0.1686	0.0556
Replacement rate	0.0592***	0.0876***	0.0449	0.0976***	0.0504***
Country unemployment rate	-0.0949***	-0.0464**	-0.1310***	-0.1092***	-0.0867***
Observations	53850	27819	22141	11,376	42,474
R <sup>2</sup>	0.175	0.185	0.158	0.214	0.178

Note: Linear regression, weighted, on a stratified sample. Constant term, country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on OECD.Stat and The Gallup World Poll

75. Taken together, models (18) and (19) present a plausible picture. The demographic and socio-economic controls have largely similar effects for both groups in the population. The unemployment rate has a larger impact on the average well-being of those people not in employment. This reflects the fact that those not in employment include the unemployed themselves; for this group, the effect of the unemployment rate includes both the direct effect of unemployment on that proportion of people who are unemployed and the indirect of the unemployment rate on people's sense of security. For those in employment, only the latter effect is captured.

76. The replacement rate is significant for the employed population, but not for the population not in employment. Whilst this is somewhat surprising, this result may be due to the fact that the not-employed population includes both the unemployed (for whom the replacement rate should be an issue) and those not in the labour market, either through choice, or through full-time education or retirement. However, when the retired are examined independently, the coefficient for the replacement rate is large, significant, and positive. This may be due to cross-country correlation between the unemployment replacement rate and pension replacement rates. Unfortunately, the lack of high-quality data on unemployment status at the individual level for many of the country/waves in this dataset prevents testing this hypothesis more closely. Thus, any conclusions reached on the basis of comparisons between models 18 and 19 remain tentative. Meanwhile, the significant impact of replacement rate on those in employment may again reflect perceptions of financial security among the employed.

77. Table 10 below considers the two additional policy variables. Coverage of country/years is significantly smaller for the employment protection legislation and health co-payment datasets than is the

case for the replacement rate dataset. Because of this, replacement rates are modelled separately from employment protection legislation and health co-payments.

**Table 10. Regression results: effects of employment protection legislation and health co-payments on life satisfaction**

	(22)	(23)	(24)	(25)	(26)	(27)
VARIABLES	All sample	People working	People not working	People with children	Aged	People of working age
Female	0.1268***	0.1404**	0.1134	0.1126	0.1620*	0.0979*
Married	0.3538***	0.3047***	0.4289***	0.4435***	0.1276	0.4656***
Age	-0.0762***	-0.0575***	-0.1034***	-0.0719***	0.0733	-0.1181***
Age squared	0.0007***	0.0006***	0.0010***	0.0006***	-0.0004	0.0013***
Log income	0.2770***	0.3057***	0.2066***	0.2688***	0.2879***	0.2725***
Secondary education	0.3097***	0.2276*	0.2585**	0.3561**	0.3695***	0.2522***
Tertiary education	0.4731***	0.3523***	0.4661***	0.7876***	0.3989**	0.5108***
No. Of children	0.0211	0.0495	-0.0179	0.0807*	-0.0611	0.0493
Rural	0.1037	0.0882	0.1946*	0.0639	0.0739	0.1213
Unemployment rate	-0.5033***	-0.5314***	-0.3238	-0.8694***	-0.1321	-0.5468***
Health co-payments	-0.0046**	-0.0053**	-0.0024	-0.0081**	0.0005	-0.0051**
Epl	0.8933***	0.9643***	0.5391	1.5493***	0.1633	1.0432***
Observations	29620	16251	11903	8900	6263	23357
r <sup>2</sup>	0.163	0.143	0.155	0.170	0.225	0.164

Note: Linear regression, weighted, on a stratified sample. Constant term and country and wave fixed-effects are included. Standard errors have been corrected for clustering within countries. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's analysis based on OECD.Stat

78. The general pattern of coefficients in regression (22) is largely consistent with earlier regressions, with one exception. The aggregate unemployment rate appears to have a much greater negative impact in regressions involving employment protection legislation and health co-payments than is the case for regressions (17) to (21). There is no obvious reason why including employment protection legislation and health co-payments in the model should have this effect, and it is likely that this simply results from the truncated sample of country/year observations included in regression (22).

79. Health co-payments show the expected negative relationship with life satisfaction, with a 1\$ increase in the mean level of co-payments associated with a fall in life satisfaction of approximately 0.005 points. Although this effect size may appear as small, it implies a relatively large impact on subjective well-being given that the level of co-payments in the dataset varies from \$214 to \$1458. The coefficient is significant in regression (22) at the 5 percent but not the 1 percent level.

80. The employment protection legislation index is also highly significant and has the expected positive sign. This suggests that, controlling for other factors, a greater degree of employment protection legislation is associated with a higher level of life satisfaction. Although the coefficient on employment protection legislation is relatively large in absolute terms, the narrower range of the underlying variable (0.65 to 3.49) suggests that the overall effect of plausible changes in employment protection legislation on life satisfaction is likely to be less than is the case for health co-payments.

81. As was the case for the replacement rate, the observed relationships for health co-payments and employment protection legislation might be driven by some omitted variables that co-vary with the policy variables of interest over the countries and years considered. Regressions (23) through to (27) attempt to provide some additional tests of the validity of the relationships observed in regression (22) by exploring how robust the observed coefficients are for different sub-groups of the population.

82. In theory, employment protection legislation ought to benefit those in the employment more than those outside it. For people with jobs, stronger employment protection legislation provides greater job security. On the other hand, people looking for work may find employers more reluctant to hire new staff in an environment where it is difficult to dismiss poorly performing workers. Conversely, for groups entirely outside of the labour market, such as the retired, we would expect to see relatively little impact from employment protection legislation. This picture is largely reflected in regressions (23), (24), (26) and (27). The coefficient for employment protection legislation is highly significant and positive for people in work – regression (23) – with a coefficient of almost 1. For the non-working population – regression (24) – the coefficient is only half the size and is not significant at the 10% level. Similarly, employment protection legislation has no significant association on the life satisfaction of the elderly – regression (26) – but a large positive and significant association on the working aged population – regression (27). In short, the relationship between employment protection legislation and life satisfaction varies across sub-groups of the population in the manner that would be expected if the regression results were capturing a genuine relationship.

83. It is somewhat more difficult to identify how the impact of health expenditure may vary across population groups than is the case for employment protection legislation. This is because out-of-pocket expenses may be a proxy of both quantity and quality of health services but also because the income variables is expressed in gross terms and thus does not reflect in-kind benefits and subsidies. The working population may be more affected by out-of-pocket health expenditure, either because in many OECD countries out-of-pocket health expenses are higher for people in work than for those out of work, due to more general health provision for the elderly population, income testing or subsidies for low income-earners, or because people of working age are richer and spend a larger amount of their income on private health for instance. The results from regressions (23) to (27) show that the coefficient for out-of-pocket health expenditure is higher for people in work, of working age and with children compared to other groups. In addition, the coefficient is significant for these groups at the 5 percent level, while it is not significant for those not working or for the elderly. This could be explained by the fact that for total health costs are the highest at the start and end of life, and for mothers around the time of childbirth.

## Conclusion

84. The primary aim of this paper has been to study the drivers of various measures of subjective well-being and to assess the degree to which subjective measures of well-being can be used to inform better policies. The latter objective is addressed both through examining the factors associated with a “better life”, as well as through directly examining the degree to which subjective measures of well-being can be affected by a difference in policy approach adopted between different countries. Although much of this territory has been well covered in the existing literature, this paper does add some insights.

85. First, the various well-being domains used in *How's Life?* and in other measuring well-being frameworks are well correlated with subjective well-being. Each domain has an independent effect of subjective well-being after controlling for the impact of other domains, although the effect size decreases as additional domains are added. This is particularly evident in the case of income. While the income coefficients estimated in this paper are lower than those found by Sacks, Stephenson, and Wolfers (2010), based on the same Gallup World Poll dataset, the result in Sacks, Stephenson, and Wolfers, do not control for other outcomes that may be correlated with income such as unemployment status, health status, or

social contact. The lower coefficient found in this paper suggest that the relationship between income and life satisfaction is mediated by these other variables. However, it is not clear whether the causal pathway is that income affects the other variables and these then drive subjective well-being, or whether these other variables drive income which then affects subjective well-being; or, indeed, whether there are one or more omitted variables correlated with both income and the other independent variables used in model (3).

86. A second issue raised by this paper relates to the nature of the relationship between life satisfaction and affect balance. It is commonly argued that evaluative measures of subjective well-being – such as life satisfaction – and affective measures provide information on fundamentally different factors that affect well-being, and are thus independently important to policy (see for instance Stiglitz *et al.*, 2008). Our analysis suggests that both life satisfaction and affect balance have a very similar set of drivers, but that the size of these drivers is different. For example, when looking at affect balance, economic factors are much less important as drivers of well-being, and social factors comparatively more so. The conclusion that both life evaluations and affects respond to the same set of drivers, however, may also reflect the specific way in which the measurement of affect is operationalised in the type of surveys used here, as compared to the best practice (i.e. some type of time-use diary) suggested by research in this field.

87. Finally, this paper also suggests that a number of policy parameters may impact directly on subjective well-being. In particular, the analysis shows strong and robust positive effects for higher unemployment replacement rates and for stronger employment protection legislation. Since these results are driven by relatively small differences in policy approach between countries, some caution is warranted in the interpretation of these results; further, even if confirmed, evidence of such direct impact does not imply that changes in the policy parameters in the direction of increasing subjective well-being will necessarily be “desirable” (these policy changes may also negatively impact of other dimensions of people’s life, or may be unsustainable in the longer term).<sup>20</sup> Nonetheless, the fact that the results are robust across the various specifications and align well with the expected underlying relationships suggests that looking for the impact of policy variables on subjective well-being in large cross-country datasets is a promising area for research. As the Gallup World Poll accumulates more waves over time, this sort of analysis could become increasingly powerful with respect to identifying the impact of policies on different aspects of people’s lives.

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The policy results in this article are based off only four waves of data, giving a maximum of three policy transitions per country for each policy variable. In practice, the results are driven by a much smaller set of transitions – particularly in the area of employment protection legislation where change occurs only through the legislative process (replacement rates are affected by changes in earned income as well as the underlying rules of the social insurance system).

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