NBER WORKING PAPER SERIES

MEASURING AND UNDERSTANDING SUBJECTIVE WELL-BEING

John F. Helliwell
Christopher P. Barrington-Leigh

Working Paper 15887
http://www.nber.org/papers/w15887

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2010

This paper includes material presented to, and benefits from discussions at, the OECD symposium on 'Measuring Subjective Well-Being: An Opportunity for National Statistical Offices?', Florence, July 2009. We are grateful to other presenters and participants for their insights and advice, to the Gallup Organization for access to the data from the Gallup World Poll, and to the Statistics Canada Research Data Centre at UBC for access to the full data files for GSS17. We are also grateful for the research collaboration of Shun Wang, Haifang Huang and Anthony Harris, and for the financial support of the Canadian Institute for Advanced Research (including a Junior Fellowship Award for C.P.B.-L.) and the Social Sciences and Humanities Research Council of Canada. The views expressed herein are those of the authors and do not necessarily reflect those of the National Bureau of Economic Research.

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NBER Working Paper No. 15887
April 2010
JEL No. A13,I3,J1,P51,P52

ABSTRACT

Increasing attention is being paid in academic, policy, and public arenas to subjective measures of well-being. This promising trend represents a shift towards measuring positive outcomes in psychology and greater realism in the study of economic behaviour. After a general review of past and potential uses for subjective well-being data, and a discussion of why some economists have previously been sceptical of SWB data, we present global and Canadian examples from our own research to illustrate what can be learned. Differences in subjective well-being will be shown to be large and sustained across individuals, communities, provinces and nations. Although the patterns of subjective well-being are very different across Canada than across the world, we show that in both cases the differences can be fairly well accounted for by the same set of life circumstances. Our examples of policy-relevant research findings include new accountings of the differences in individual-level SWB assessments around the world and across Canada. These highlight the importance of social factors whose role has otherwise been hard to quantify in income-equivalent terms.

John F. Helliwell
Canadian Institute for Advanced Research
and Department of Economics
University of British Columbia
997-1873 East Mall
Vancouver B.C. V6T 1Z1 CANADA
and NBER
john.helliwell@ubc.ca

Christopher P. Barrington-Leigh
Canadian Institute for Advanced Research
and Department of Economics
University of British Columbia
997-1873 East Mall
Vancouver B.C. V6T 1Z1 CANADA
http://wellbeing.econ.ubc.ca

Introduction

In this paper our primary purpose is to convince economists that subjective well-being (SWB) data, and the analysis that flows from them, enable previously non-comparable social aspects of life to be assessed consistently with economic outcomes, thereby increasing the relevant domain of economic and social analysis. After a general review of past and potential uses for subjective well-being data, and a discussion of why some economists have previously been sceptical of SWB data, we present global and Canadian examples from our own research to illustrate what can be learned. Differences in subjective well-being will be shown to be large and sustained across individuals, communities, provinces and nations. Although the patterns of subjective well-being are very different across Canada than across the world, we show that in both cases the differences can be fairly well accounted for by the same set of life circumstances. Finally we discuss policy uses for different types of subjective well-being data and offer specific examples to show how the results can and have been used in both macroeconomic and microeconomic policy environments. In our conclusion, we argue that subjective well-being data can be used as proxy measures for experienced utility, and hence can reveal preferences in places and circumstances where more conventional revealed preference analysis is not possible. Finally, an appendix summarizes the key measures of subjective well-being that are most relevant for broad-scale collection and analysis.

Background

In several disciplines, and by several different pathways, measures of subjective well-being are playing increasingly important roles in applied research. Within psychology and medicine, where subjective reports of pain and illness have been central to diagnosis and treatment for many decades, the expanding role for overall measures of subjective well-being illustrates a greater interest in the determinants and consequences of positive states of mind. This change has been sparked by research showing that the effects of positive mental states are often more important than the absence of negative states in the prediction of subsequent morbidity and mortality. For example, Cohen et al (2003) found a strong dose-response relation between a subject's positive emotions and the symptoms resulting from experimental exposure to common cold germs, while the corresponding relation for the absence of negative emotions was small and insignificant. Similarly, the nun study (Danner, Snowdon and Friesen 2001) divided the autobiographies of novitiates into quartiles according to their reflection of positive and negative emotions, with the two types accounted for separately. Several decades later, when the nuns were in their 70s, those in the lower half of the positivity scale had mortality rates 2.5 times as high as those in the top quartile. There was no corresponding relation for the presence or absence of negative emotions. These and other findings showing the independent importance of positive emotions was reflected in the title chosen for the first major interdisciplinary survey of the emerging science of well-being: *Well-Being: The Foundations of Hedonic Psychology* (Kahneman, Diener and Schwarz 1999). Given the previous dominance of the study of negative emotions within psychology, it is perhaps not surprising that there is

now a flourishing sub-discipline in positive psychology, including many clinical and popular applications.

Within philosophy, economics, and political science, there has traditionally been a more balanced consideration of positive and negative measures of well-being. Bentham and Edgeworth treated pleasure and pain symmetrically, and defined utility as an integral of momentary measures. Aristotle and other ancient philosophers put stock instead in how people would evaluate their lives as a whole (Annas 1993). The choice between aggregating current moods and asking for overall evaluations is not just a matter of taste, because measures of mood and life evaluations differ systematically, in ways that confirm the information content of both.

Modern scholars, whether experimentalists or analysts of subjective survey data, have found systematic differences between Benthamite aggregations of moment-by-moment assessments and retrospective evaluations based on memory. In particular, retrospective evaluations of experiences as diverse as a colonoscopy (Redelmeier and Kahneman 1996) or a mid-term break (Wirtz et al 2003) were systematically different from the aggregated samplings of moment-by-moment experiences. Given these differences, Kahneman (Kahneman, Wakker & Sarin 1997) was inclined to take a Benthamite tack, arguing that the integrals of momentary experiences were a more authentic measure of utility, so that in the case of divergence between them and remembered assessments the latter should be regarded as mistakes. He even proposed (Kahneman 1999) referring to the summation of momentary assessments as objective happiness, "because it is constructed according to an objective rule, even though it is ultimately based on subjective reports.." (Kahneman & Riis 2005, p.291).

A substantial difference between remembered and experienced well-being comes about because it is memories rather than the average of momentary reports that are found to influence subsequent decisions about medical treatments and holiday plans. Helliwell (2008) argued that this difference provides a primary reason for preferring the remembered to the experienced measure in cases where the two differ. In addition to this conceptual preference, the cost/benefit balance in favour of the remembered over the currently measured is improved further by their relative ease of collection. Remembered evaluations can be assessed at low marginal cost in the context of regular surveys that in turn can provide contextual information important for analysis. These measures can thus be collected in the very large samples required for meaningful disaggregation by location, time and population sub-group, something that is never likely to be feasible for the more expensive and invasive momentary assessments.

There is a related distinction between measures of mood (measures of positive and negative affect) and life evaluations. Life evaluations rely more on cognitive assessments of life as a whole, and thus rely on remembered experiences and assessments of current prospects, as well as being influenced by one's current emotional state. Emotions may be assessed either moment by moment, or, more usually, on a remembered basis at the end of an assessment period. One fundamental difference between measures of mood and life evaluations is that the latter depend much more, as Aristotle predicted, on the

circumstances of people's lives (see, especially, chapters 1 and 10 in Diener, Helliwell, and Kahneman, eds. 2010). This increases the reliability of life satisfaction relative to measures of mood as indicators of overall well-being (Diener et al 2009, pp. 84-93).

More recent research has downplayed the 'either-or' nature of the preference for remembered versus experienced measures of well-being, arguing instead that both have roles to play and that overall understanding is improved by using multiple measures (Diener, Helliwell and Kahneman, eds. 2010, pp. x-xi). Moods change more frequently than do life assessments, and hence are more likely to have interesting diurnal and daily patterns. Measures of life satisfaction, on the other hand, are more reflective of overall and continuing life circumstances, and are hence more suited to capture longer term and international differences in policies and institutions.

Why are some economists sceptical of subjective well-being?

While economists have been fairly even-handed about their treatment of positive and negative outcomes, they have often been sceptical of subjective variables in general, and perhaps especially measures of subjective well-being. When we have over the years presented results of our research, we hear many of the same questions. Answers to most of these questions about the reliability and validity of different measures of subjective well-being may be found in Diener et al (2009). We shall note here just one or two examples, to provide a bridge to our empirical analysis of international and inter-provincial differences in subjective well-being.

Perhaps the most frequently used dismissive reference by economists is to the Brickman et al (1978) paper on lottery winners and accident victims. This paper is often treated as confirmation of a version of adaptation or set-point theory in which changes in a person's life circumstances may influence their subjective life evaluations for some period, after which their adaptive powers and instincts will return them to a set point determined by their underlying personalities. If this interpretation were correct, it would provide a sufficient reason for avoiding the use of life evaluations as proxy measures of utility. However, the Brickman et al (1978) accident victims reported overall happiness 22% lower than that of the controls, while the lottery winners were 5% happier. Because of the small sample sizes (22 lottery winners, 22 controls and 31 accident victims), these differences in mean happiness were significant only for the accident victims. What was needed was more research, not a rush to accept the idea that adaptation is complete. Meta-analysis of subsequent cross-sectional studies (Dijkers 1997), and analyses using panel data (Lucas 2007) confirm that while partial adaptation generally occurs in the case of spinal cord injuries, the long-term effects on life satisfaction are significant and large, equal to 1.2 standard deviations for those with the most severe disabilities (Diener et al 2009, p.105). Since the absence of full adaptation has now been accepted, recent attention has naturally moved on to consider what circumstances and which treatments are likely to improve the lives of accident victims. For example, recent research has investigated the determinants of well-being outcomes following cardiovascular accidents, finding that for

any degree of accident severity, those individuals who have and can maintain more active social networks fare better (Haslam et al 2008).

Another group of sceptical questions relates to comparability of subjective evaluations by those in different circumstances. How can poor people, and especially those in dysfunctional societies, be happy? If they report high levels of subjective well-being, do their answers simply reflect their ignorance of how satisfying life really could be? How can we compare life satisfaction reports from people with different personalities, and from different cultures? Some versions of these questions underpin scepticism of subjective life reports, and probably help to explain the preference of Amartya Sen (1999) and others for relying on external assessments of capabilities and freedom as measures of individual well-being and of the quality of social development. These are all reasonable questions, to which research provides increasingly reassuring answers, as reported in Diener et al (2009), Helliwell et al (2010), and illustrated by our demonstrations later in this paper in our accounting for cross-national and cross-country differences in SWB. Although subjective well-being answers are indeed conditioned by culture, personality, past experience, and knowledge, the newly available data from more than 140 countries shows that differences of subjective life evaluations among individuals and across nations are largely explicable by the same life circumstances, and in similar ways, all over the globe. Material and social aspects of life are both of fundamental importance in explaining subjective well-being differences within and among nations. Because international differences in income are even greater than differences in the social context, they explain a larger fraction of differences in subjective well-being among countries than among individuals within the same country.

Measuring subjective well-being

Subjective well-being (SWB) measures may be divided into three main categories requiring independent measurement and explanation: life evaluations, positive emotions and negative emotions. These three types of measure tap into human experience in different ways, and tell interestingly different stories.

In particular, life satisfaction is more reflective of the broad and continuing circumstances of an individual's life, while emotions are more volatile. As a consequence, there are, for example, much bigger international differences in life satisfaction than in emotions (see Diener, Helliwell and Kahneman, eds. P xii), and both within and across countries life satisfaction is more highly correlated with enduring life circumstances than are emotions (Krueger and Schkade 2008). On the other hand, emotions provide a more textured tool for understanding the ups and downs of daily life. This additional texture comes from the variety of emotional states that can be assessed, and the frequency with which moods change.

Emotions can be measured as they occur, but are more usually captured by recall. Life evaluations are the result of a cognitive process taking place, or being updated, at the

time the questions are asked. Both types of report are influenced by the method of reporting.

Affective states, both positive and negative, are most effectively measured in the context of time-use surveys, while life evaluations can be measured by as little as a single question added to a variety of mainline surveys (Diener et al 2009, pp. 68-74). To better understand the linkages between life evaluations and emotions requires more systematic collection of both types of measure in the same survey.

There is ongoing discussion about trade-offs between single-item and multi-item scales as measures of life satisfaction. On the one hand, a suite of well-designed questions tapping into the same space produces a higher signal-to-noise ratio and higher test-retest scores (e.g. Krueger and Schkade 2008, p.1836). On the other hand, where questionnaire space is at a premium there is always an implicit trade-off between asking fewer questions of more respondents and asking a fuller set for a more restricted sample. Researchers typically argue for a mixed strategy. To get the best of both worlds, and to build up evidence on the existence and size of such a trade-off, statistical agencies can include single items and scales on surveys where space permits, with a single item used where space is at a premium.

On the related question of numerical scales, the goal is to combine ease of response with enough answer categories to capture the relevant variance. Experiments comparing different scales have generally concluded that scales with more options, and an odd number of them, is to be preferred (Diener et al 2009, pp.73-4). This has led to increasing use of an eleven point scale for measures of life satisfaction and similar life evaluations, within a scale bounded by zero and 10.

Life assessments and emotional reports have both been subject to validation tests, but of different types. Emotional reports have a much more complete track record of psychometric testing (Shiffman, Stone and Huffard 2008), while the validity of life evaluations has more usually been assessed in terms of their ability to play their hoped-for role as measures of utility, e.g. to provide evaluation of the relative importance of the factors presumed to underpin a good life (Diener et al 2009, chapter 5). Greater accumulation of comparable samples, ideally including ones where life assessments and emotional reports are both included, will permit deeper understanding of the properties of, and linkages between, different measures of subjective well-being. For example, Krueger and Schkade (2008) show roughly equal test-retest reliabilities for assessments of mood and of life satisfaction, but a different structure for their likely determinants, with life circumstances, e.g. income, having a closer linkage to life satisfaction than to mood.

Kahneman and colleagues (Kahneman et al, 2004, Kahneman & Krueger 2006, Krueger, ed. 2009) have proposed a mood-based remembered measure of subjective well-being. This falls in the middle ground between momentary assessments (Shiffman, Stone and Hufford 2008) and average assessments of mood or of life as a whole. It provides a natural extension to regular time use surveys, since it uses a Day Reconstruction Method

(DRM) to ask respondents what they were doing, and how they felt, at different times during the day. Although it has been shown that later recalls differ from in-the-moment assessments (Stone et al 2002), the mood assessments are matched to the activity reports, so the overall cost of collection does not differ much from that of a regular time-use survey. In addition, the simultaneous collection of mood assessments, both positive and negative, and life evaluations opens the door to better understanding of how these measures relate to one another. Finally, adding specific well-being measures to time accounting is a step that any economist familiar with time-use studies would easily accept, thus providing a natural first step to building a broader role for measuring well-being as part of the national accounting system (Krueger, ed. 2009).

While subjective well-being lies at the centre of research, there has also been a parallel increase in the strength of professional and popular perceptions that GNP is an inadequate measure of national progress. For example, the Stiglitz-Sen-Fitousi (2009) report commissioned by French President Sarkozy proposed improvements in GNP accounting, more widespread collection and use of measures of subjective well-being, and more systematic attention to long-term sustainability. Other countries and organizations have already developed indexes designed to measure well-being more broadly. The most well-known example is the World Development index of the UNDP (http://www.undp.org/hdr2009.shtml). More recently, the Happy Planet index (http://www.happyplanetindex.org/) divides the product of a nation's average life satisfaction and average life expectancy by a measure of a country's environmental footprint to provide a measure of the environmental efficiency of a country's delivery of subjective well-being. Taking a different tack, the Legatum Prosperity index (http://www.prosperity.com) is an equally weighted average of two sets of indicators, one a set of factors best explaining international differences in subjective life evaluations, and the other a set of factors explaining GDP per capita. The government of Bhutan, which has Gross National Happiness as its constitutionally embodied goal, currently measures its national progress by an equally weighted average of nine component indicators, including a direct measure of subjective well-being and eight indicator variables considered likely to support sustainable well-being (http://www.grossnationalhappiness.com/). There is an unofficial Canadian index of well-being (http://www.ciw.ca/en/TheCanadianIndexOfWellbeing.aspx) which is an equally weighted average of eight sub-indicator variables, none of which include measures of subjective well-being. However, subjective well-being research has apparently been used to inform some of the choices of weights (e.g. on inflation and unemployment) in the sub-indicators.

These and other examples of broader well-being indicators provide evidence of growing interest in broader measures of well-being, but all suffer from their use of a priori weights on their various components. Since the levels and rates of growth of the resulting well-being indicators are usually heavily dependent on the choice of weights, the resulting indicators necessarily reflect the preferences of the designer of the index. Direct measures of subjective well-being offer a way out of this box, since they can be used to provide direct citizen-based measures of well-being that can in turn be used to estimate weights to be attached to candidate explanatory variables. Such indices can then be constructed

when the component variables are more easily, frequently, or precisely measured than the directly-assessed well-being. The ability of subjective well-being measures to deliver on this possibility depends on much broader and systematic collection of subjective well-being data, ideally in a range of surveys that collectively provide appropriate measures of the economic and social life circumstances of the respondents, and of the communities in which they live.

Most of the discussion about the need for SWB measures relates to life evaluations, since they have greater claims to be direct measures of overall well-being, and the latter is increasingly used as an announced goal for public policy. If these measures are sufficiently reliable, they can be averaged across individuals to provide summary measures of the perceived quality of life in neighbourhoods, cities, regions and countries, and across population sub-groups. Where these average measures are already collected and published, they attract considerable interest, especially among the general public. Changing the balance of what is measured and reported on a regular basis is likely in turn to change the nature of policy thinking among both policy-makers and those living with the policy results.

Creation of a new and somewhat appealing measure of overall well-being creates opportunities and risks for policy-makers. On the risk side, these new measures create demands for explanations of movements (even if such movements are within normal statistical variations), and of divergent levels of well-being among segments of the population, followed by a demand for policies designed to make life better. On the opportunity side, the measures offer the possibility of improved understanding of what makes for better lives, and clearer insights into the links between policies and SWB.

An analogy can be drawn with the development in the middle of the last century of national accounts of income and expenditure. These accounts did not come with explanations of the causal linkages, or prescriptions for creating stability and growth. They were instead seen then, and are still seen, as providing a necessary base on which a greater understanding of the macro-economy could be built, with the hope that this enlarged understanding would permit better policies.

Using subjective well-being data for international comparisons

In this and the following section we shall emphasize the measurement and explanation of differences in average life assessments, first among countries and then among Canadian regions. There are several reasons for this. First, the aggregation of subjective assessments over large numbers of respondents (usually several thousand in each sub-aggregate) permits us to minimize correlations caused by individual personality differences, making the remaining differences more likely to be due to average differences in life circumstances. Second, those who have seen earlier comparisons of international and inter-provincial differences in subjective well-being will have wondered how it comes to pass that among countries there is a strong positive simple correlation

between average life evaluations and average per capita incomes, while across provinces the simple correlation is negative, sometimes significantly so.

In this section and the one to follow we show that similar models apply to individuals in both national and international samples, so that we can explain both international and inter-provincial differences in subjective well-being in terms of different life circumstances, augmented in the global case by some international differences in the relative importance that individuals in different nations implicitly attach to different aspects of life.

We start in this section with international comparisons, making use of data from the first three waves (2006-2008) of the Gallup World Poll. Some waves include our preferred measure of life satisfaction, while all waves include an alternative life evaluation, Cantril's 'self-anchoring striving scale', referred to here as the Cantril ladder. Although these two alternative measures of subjective well-being have somewhat different distributions of responses, they provide essentially the same coefficients when applied to the same samples of data (Helliwell et al 2010). Since the sample of Cantril ladder responses is much larger, we use them for our analysis here. The question asks respondents to think of a ladder, with the best possible life represented by 10, and the worst possible by 0. They are then asked on which step they personally stand at the present time. We use these evaluations, from more than 150,000 respondents in 125 countries, for the analysis in this section.

International differences in life evaluations are very large. The Cantril ladder responses average 7.66 for the top four countries (Denmark, Finland, Norway and the Netherlands, in descending order- Canada is sixth), compared to 3.33 for the bottom four countries (Togo, Sierra Leone, Zimbabwe and Benin, in ascending order). In proportionate terms, the differences in average real incomes, at purchasing power parity, are much larger still. In 2005 the top four countries had real per capita GDP averaging 88% of those in the United States, compared to 2% for the bottom four countries. But there is clearly much more at play than per capita incomes, since the countries at the top of the subjective well-being ranking are not those with the highest incomes. Average incomes are, nonetheless, the single most important variable explaining international differences in average life assessments in the Gallup World Poll. Some have taken this result as support for treating growth of GDP per capita as the overriding goal, and measure of success, of international development policies and practices. But the life evaluations provide a much broader and more complete assessment of the quality of life. Since the additional variance is explained by the same variables that explain differences among individuals within the same country, along with other measures of the quality of the national social and institutional fabric (Helliwell and Huang 2008), there is scope for explaining international differences in well-being in terms of average values of income and other variables measured at the individual or household level.

To illustrate the possibilities, we shall use the results of a fairly bare-bones model using individual data to explain SWB by the log of household income, whether the respondents had relatives or friends to count on if needed, whether the respondents were satisfied with

their freedom to choose what to do with their lives, whether corruption was widespread in business and government, and whether they had donated money to a charity in the past month. This is a slightly trimmed-down version of the base model used in Helliwell et al (2010) to explain global (in Table 10.1, eq 1), regional (Table 10.2) and national (Figure 10.3) samples. Coefficients estimated using global samples of individual data, both with and without regional dummy variables, were essentially identical to the means of the distributions of the coefficients estimated in national models. We therefore emphasized the apparent generality of our results, and concluded that life evaluations could be compared across cultures, since they were apparently explicable by the same variables.

This remains our view. But now that we wish to see what we can say in quantitative terms about the sources of international differences in subjective well-being, we need to consider simultaneously the relevant differences in coefficients as well as the differences in underlying circumstances. Differences across countries in average measures of subjective well-being will be due to differences in life circumstances, to differences in the ways they are evaluated, and to a variety of national-level social and institutional factors. For our example analysis, we shall compare life evaluations for the OECD and non-OECD countries. Figure 1 shows the average values separately for the respondents in OECD and non-OECD countries, and for the global sample as a whole. The data show quite clearly that life evaluations, and average values of all of the model's variables, are higher in the OECD sample, but that the differences in average incomes (at purchasing power, relative to the United States) are much greater than in personal social capital (friends or relatives to count on) or institutional quality (perceived freedom and corruption). Average life evaluations, on a 10-point scale, are 6.8 in the OECD compared to 5.0 in the non-OECD sample (but scaled to the range 0 to 1.0 for presentation in Figure 1).

To use the international differences in selected explanatory variables to explain observed differences in life evaluations, we estimate a pooled equation to estimate global parameters and use these to explain the size and significance of the contributions of each of the independent variables. We do this using the Jann (2008) implementation of the decomposition method suggested much earlier by Blinder (1973) and Oaxaca (1973) for explaining wage differentials. Coefficients estimated from the pooled global sample are used to calculate the contributions of different life circumstances in explaining the overall difference of means[1]. The results are shown in Figure 2. Of the total 1.8 points of SWB difference (on the 10-point scale, hence a difference equal to more than a third of the average value for non-OECD respondents) to be explained, almost one point is attributed to the income difference between the two groups of countries. Each of the four social and institutional variables contributes much smaller, but significant, amounts, totalling about 0.35 points.

The unexplained difference, represented by the coefficient on the OECD dummy variable in the pooled equation, is 0.5 points. There are a variety of reasons for this gap. One is that there are many relevant national-level excluded variables. If average institutional quality is higher in the OECD countries, and if this higher quality is not fully captured by the freedom and corruption variables, then that would serve to support a positive residual.

Higher institutional quality in the OECD is plausible, since achieving pass marks on a number of institutional benchmarks is a criterion for access to the OECD. Another possibility is that there are systematic coefficient differences between the OECD and non-OECD countries, reflecting differences in relative importance of variables in different cultures, or the possibility that the relative importance of variables might change as countries and their institutions develop.

Figure 3 shows that there are indeed significant coefficient differences between the two samples, and that these differences are generally of a sort to explain the residual. The differences do not relate to log income, for which the coefficient is remarkably similar in the OECD and non-OECD samples. The coefficient of .46 on the log of household income implies that a doubling of household income would be associated with life evaluations higher by 0.32 points. But for the main social and institutional variables - count on friends, freedom, and absence of corruption - coefficients are significantly higher in the OECD countries. Thus, even though all three aspects of society are perceived by respondents as being inferior in the non-OECD countries, the resulting SWB consequences are much less when they are evaluated using the non-OECD coefficients. The differing coefficients on freedom and corruption, taken together, are as large as the unexplained residual in Figure 2. It has often been argued, e.g. by Maslow (1943), that once basic needs are met then more attention will be devoted, and more relative value attached, to other needs. This has been used in support of findings of lower long-run income-elasticities of SWB at higher levels of income (Di Tella and MacCulloch 2010). A similar appeal to changing priorities as incomes grow has been used to explain the environmental Kuznets curve (Arrow et al 1995). Our results also show higher relative values attached to the non-economic aspects of life at higher average levels of income and institutions (the OECD definition tends to conflate these), although in our results this comes not from a declining income effect but from higher coefficients on other aspects of life. Is this finding replicable in other samples, and in different models? Is it likely to show up as increasing coefficients on the social context variables as countries develop? These are research-worthy questions, in our view.

Which Canadians are more satisfied with their lives, and why?

Explaining the international SWB gap was mainly a story about income, primarily because income differs so much from the richest to the poorest countries. And across countries, most of the non-economic supports for well-being tend, on average, to be higher in the richer countries. But when we turn to consider interprovincial differences in subjective well-being, things are very different. For starters, the cross-province correlation between average incomes and average life satisfaction is negative rather than positive. This implies, if similar models are applicable in Canada as in other countries, that some of the non-economic supports to well-being are higher in the poorer provinces, by more than enough to offset the SWB effects of lower incomes.

We shall repeat the same sort of decomposition of interprovincial differences that we performed in the previous section for international differences. We now have the benefit

of a survey (cycle 17 of the Canadian General Social Survey) that has the life satisfaction question along with an extended set of social variables shown by Helliwell and Putnam (2004) to be highly correlated with differences in SWB. As before, we mainly use a stripped-down version of a models we have estimated previously using GSS17 and other Canadian surveys. Barrington-Leigh and Helliwell (2008 and electronic appendix) provides the fullest description of a variety of models and results. For this paper, to make it easier for others to replicate and improve our analysis, our estimation employs the public use micro file (PUMF) version of GSS17. This has meant that we have to ignore the effects of contextual variables, since their use requires respondents' locations, which are not provided in the PUMF. Of the census-tract variables we have included in an expanded estimate that uses the confidential micro data, the most significant contribution, which is not large, to explaining Atlantic/BC differences in life satisfaction is the population density in the respondent's census tract (i.e. population density has a negative effect on SWB, so that the lower density in the Altantic provinces helps to account for the higher SWB there).

For our illustrative example, we compare life satisfaction in the Atlantic provinces with that in British Columbia. Although this choice of regions does include the highest and lowest average regional SWL values, the same underlying story falls out if we compare the Atlantic provinces to any other region of Canada, or to the rest of Canada as a whole. Figure 4 shows life satisfaction, income, and five key social variables for each of the two regions. The first thing to note is how small are the regional differences in life satisfaction, compared to the international differences. The Gallup top four countries had life evaluations 4.4 points higher than the bottom four, and the average life evaluation in OECD countries was 1.8 points higher than in non-OECD countries. Between the Altantic provinces and BC, by contrast, the difference is 0.18 points, an order of magnitude smaller. But it is nonetheless something worth studying, because to achieve such an increase in life satisfaction through higher incomes would require them to be increased by more than half, according the GSS17 and other estimates of the effects of income on subjective well-being. As for the determinants of subjective well-being, all of the differences are also smaller than the international ones, but between these Canadian regions, the non-economic determinants shown here all favour the Atlantic provinces.

Another difference between the regional and the international decompositions is that there are no significant coefficient differences between the Atlantic provinces and BC[2]. Since the basic institutional frameworks are similar in all parts of Canada, we would be more inclined to expect similar coefficients than in the international case. Figure 5 shows the contributions of each of the variables to explaining the life satisfaction gap between the Atlantic provinces and British Columbia. Income, of course, favours BC, and hence increases the gap remaining to be explained. The other variables, all of which relate to the extent and ease of social connections, and the extent to which these connections lead to a greater sense of belonging to the community or province, favour the Atlantic provinces. The variables selected for this example are illustrative of a number of alternative ways of measuring the sources and manifestations of social capital. In this setup, the largest contribution is made by differences in the extent to which people feel they belong to their local communities, with an important additional effect from a sense of belonging to one's

province. But we also find very large effects from the size and the intensities of the individual's networks of both family and friends, shown in our current decomposition by differences in the frequency of seeing friends, and the extent to which neighbours are trusted. These social network effects remain important even after including the sense of belonging to community and province, two social identity variables that serve as important channels by which social connections support well-being. In our interpretation of these estimates, the greater sense of community and provincial belonging in the Atlantic provinces contributes more to average satisfaction with life than is provided in BC by the higher average incomes there.

Figure 5 shows that while the selected social variables offset more than twice the income advantage of BC, there is still a residual favouring the Atlantic provinces. This is not due to significant coefficient differences between Atlantic Canada and British Columbia, because the Blinder-Oaxaca decomposition does not reject cross-regional equality of coefficients. We considered whether the greater fraction of native-born residents in the Atlantic Canada might be part of the story, as it always takes time and effort for newcomers to develop a full range of supporting networks. In the GSS17 sample, the proportion of foreign-born respondents is .05 in Atlantic Canada, compared to .28 in British Columbia. We added immigrant status as another variable, and found it took a negative but weak coefficient, sufficient, if taken at face value, to account for one-quarter of the remaining unexplained residual of .08. We also considered the effects of differing average rates of unemployment, since the SWB effects of unemployment have been found to be substantial. For example, in national estimation using GSS17, being unemployed is associated with 0.53 lower satisfaction with life, holding income levels constant. When we included unemployed status as an additional variable, it did not significantly add to the explanation of the BC-Atlantic difference. This is mainly because in both regions there are relatively few unemployed, as a share of the population. Using the national coefficient as a guide, each inter-regional difference of unemployment equal to 1% of the population (roughly 1.5% of the labour force) would lower the region's average life satisfaction by .0053 points (.01*0.53), not enough to show up in the regional averages. Finally, we expect that some part of the remaining Atlantic advantage may be due to relative income effects, of the sort found in earlier work by Luttmer (2005) for the United States, and by Barrington-Leigh and Helliwell (2008) and Helliwell and Huang (2010) for Canada. It is not possible to take these into account using the PUMF data, since the most relevant relative incomes relate to those in the same geographic neighbourhood as the respondent.

In any event, our aim here is not to provide an exhaustive accounting for inter-regional differences in well-being. What we do hope to have done is to broaden the perceived validity of subjective well-being measures by showing that they are robustly correlated with theoretically plausible explanatory variables, whether these differences are measured across individuals, across communities, or across the world. Furthermore, when the estimation results are applied to decompose interregional and international differences they tell plausible and mutually consistent stories.

How can SWB data be used to improve the understanding and design of policies?

Measures of subjective well-being offer ways of changing policy-making in several fundamental ways. First, and most fundamentally, they provide means for comparable evaluation of diverse features of life long recognized as important, but too often left on the sidelines when policy decisions are made. Second, research using direct measures of subjective well-being is already showing the importance of collecting and paying heed to assessments of life from the whole population, rather than just measuring and repairing bad situations. Third, subjective well-being research is showing the great importance of the quality of social identities and social capital as supports for better lives. This should help to put the 'social' back into the social sciences, which have tended in the past half century to focus on individuals and their relations to impersonal institutions. Fourth, there is a still-emerging strand of subjective well-being research emphasizing the importance of generosity and other pro-social behaviour as supports for life satisfaction (Borgonovi 2008). This may help to understand the high SWL in countries and cultures with high levels of social and environmental supports, where helping others and sharing gains are more important social norms. Fifth, the well-being consequences are seen to depend as much on how things are done as on what is done; both the perceived fairness and the extent of effective participant engagement are important support for procedural utility (Frey, Benz and Stutzer, 2004).

The primary use of SWB data on life satisfaction is as a research tool to assess the relative importance of the likely drivers of SWB. For that initial step to be illuminating, it is necessary to have reasonable proxies or data for the likely drivers of well-being. This is where the more traditional objective indicators of well-being come into their own as variables explaining overall life satisfaction, especially if they can be provided in sufficiently disaggregated form to explain individual-level SWB observations.

The use of SWB data in this way is subject to three main difficulties. Perhaps the most important is that most surveys in which SWB questions are asked are cross-sectional in nature, making it difficult to identify an underlying causal structure. Perhaps the best way of dealing with this is to recognize the existence of two-way relationships, and hence to treat the results as indicative of a connection, with various experimental methods being used to quantify more definitive causal channels.

A second difficulty is that life is complicated, with an impressively large number of plausible explanatory variables, at both individual and societal levels. This suggests that even strong linkages be treated with humility, and initially treated as symptomatic of a general line of influence.

Third, the currently available samples are inevitably too small to smooth out all the noise that creeps into the measurement of any variable, perhaps especially so for self reports. Self-reports have the advantage of directly measuring what analysts want to know (the level of life satisfaction) coupled with the difficulty that the answers given depend often and importantly on where the question is in the survey, how the respondent's favourite sports team is doing, and whatever else was going on when the surveyor turned up at the

door or on the phone. There are several strategies to reduce these difficulties, including extensive cognitive testing of alternative wordings and questionnaire layouts, randomization on a variety of key factors, and building large and repeated samples from comparable surveys. If the results converge, then the case is strong, and vice versa.

Data on emotions come into their own in the analysis of the daily life course, and, traditionally, as leading indicators of morbidity and mortality. This separation of the uses of life evaluations and emotions is too stark, as it is driven by the fact that health surveys and experiments have traditionally given privilege to measures of affect rather than life evaluations, while measures of positive and negative affect have been too seldom been included in large surveys.

If it is possible to identify a fairly tightly estimated model of the determinants of global SWB, then the relative sizes of the effects can be used to make judgements of the relative importance of factors, e.g. workplace trust and income (Helliwell and Huang 2010), that had previously remained as different as chalk and cheese. This is very helpful for evidence-based policy-making, which usually requires some way of comparing the costs and benefits of alternative policy options. But of course most of the factors influencing well-being are themselves not connected in any simple way to conventional policy instruments. Hence a second level of research is required to determine what methods of policy design and delivery are most likely to improve the quality of life.

Results from existing well-being research, based on surveys and policy experiments, show that the ways in which policies are designed and delivered are often more important than anything else. This in turn suggests opportunities to improve well-being at low cost by increasing the opportunities for people to be more actively engaged.

Finally, well-being and related psychological research has shown the dominance of social norms as drivers of behaviour, and adherence to social norms as a strong support for individual life satisfaction. This has important implications for the design of environmental policies, especially those intended to reduce global warming, since much of the required changes in resource use are likely to be driven by changes in social norms. To illustrate the possibilities more concretely, we shall describe two examples, one micro and one macro, from among the many described in Diener et al, (2009). The micro example relates to the evaluation of Canadian policy experiments, while the macro example uses individual SWB from a sample of countries to estimate trade-offs between inflation and unemployment.

The Community Employment Innovation Project (CEIP, Gyarmati et al.2008) offered communities the chance to design and administer programs by which recipients of employment insurance or income assistance were offered jobs in community development. Participating communities formed boards to select and manage community development projects, using both volunteers and employees paid for by CEIP. The assignment of individual participants either to CEIP employment or to the control group was random, so that the effects of the intervention could be clearly identified. The labor market and social capital consequences for the individual participants were then

converted to a common basis using weights derived from life satisfaction equations, making use of survey data obtained from all individual participants at the end of the project. Without the availability the SWB data and research, there would have been no clear way to compare and combine labour market and social capital consequences for individual participants. The study unfortunately did not include life satisfaction assessment at the beginning of the project, so that standard experimental assessments of the life satisfaction effects were not possible.

SWB measures were also used to evaluate community-level effects, for which the experimental method had to be slightly different, as each participating community chose its own pace and mix of activities, and the selection of comparable control communities was performed by matching rather than by random assignment. Community-level surveys were conducted at the beginning and end of the CEIP program, with life satisfaction data collected only in the final survey. Life satisfaction data were again used to estimate equations for the likely determinants of well-being, and hence to provide weights for the cost–benefit analysis of the social capital and other community-level effects. Social capital effects were estimated to provide a large part of the total benefits (CEIP, Gyarmati et al.2008). Without the SWB data and results, the community-level social capital effects could not have been included directly in the cost/benefit results of the CEIP experiments.

An instance of a macroeconomic application of SWB measurements (Di Tella & MacCulloch 2007) uses a panel of 600,000 individual-level life evaluations (satisfaction with life, from Eurobarometer surveys 1973-2002 in 16 European countries) to estimate a trade-off between unemployment and inflation. The authors offer their results as an alternative to the a priori weights often used (e.g.the so-called 'misery index', which has equal weights attached to a percentage point of unemployment or inflation) in the welfare assessment of alternative macroeconomic policy trajectories.

Conclusions

In this paper we have tried to make a case for wider collection and use of subjective well-being data. After a general review of the past and potential uses for these data, we presented global and Canadian examples from our own research to illustrate what can be learned. Differences in subjective well-being were seen to be large and sustained across individuals, communities, provinces and nations. To a striking extent, we found that these differences correlated with life circumstances. Differences in life satisfaction among countries were seen to be ten times as large as those among provinces, as were, on average, the differences in the main determining variables. The cross-sectional correlation between per capita incomes and subjective well-being is strongly positive among nations and weakly negative among provinces. This difference comes about not because the effects of incomes on life satisfaction differ among countries and provinces, but because the international distribution of income is much more unequal that that among provinces. Hence income dominates the explanation of international differences in life satisfaction. In the interprovincial case, income differences are much smaller, and are more than offset by the stronger and more supportive social environment in the Atlantic

provinces. In the international context, by contrast, many of the poorest countries are also afflicted with poorer health and weaker supports from family, friends and public institutions. Overall, we find that the very large differences among countries in average levels of subjective well-being are mostly explained by similar responses to differing life circumstances, coupled with what appear to be systematic differences between individuals in OECD and non-OECD countries in the SWB effects of several non-economic determinants of life satisfaction. As would be suggested by Maslow's (1943) hierarchy of needs, the relative value of the social determinants of SWB (as measured by compensating differentials) is higher for residents of the generally richer OECD countries. This result does not appear to be due to a declining partial effect of log income in the richer countries, but to greater importance of the social variables in the richer countries. This new pattern of results needs more research to assess its generality and to assess its likely sources.

As we have tried to show, measures of subjective well-being are changing the social and policy sciences in several fundamental ways. For economics and economists to contribute fully in these developments will require a wider focus than is usually taken in economic research, and a broader set of tools than is currently provided to students of economics.

In recent years, behavioural economics has broadened the empirical foundations of both micro and macroeconomics, and has opened up models and assumptions to accommodate findings from psychological research. While changing fundamental assumptions to accord more closely with reality offers the promise of better predictions, if the more complicated models can be made tractable, it poses a dilemma for welfare economics. A behavioural utility function constitutes only half of the foundations of the microeconomic enterprise; the other half is the utility function that defines welfare. Behavioural economics findings, often described as "anomalies", show that in some domains people's choices do not seem to serve their own best interests. In the neoclassical tradition, there should be no difference between the utility function implied by revealed preferences and that describing what is best for the individual. But the latter concept of welfare has not evolved fast enough to keep pace with behavioural findings. What, then, is to provide the empirical accountability for a definition of a person's best welfare interests?

Subjective well-being data offer a promising new version of what might be called revealed preference of well-being, one designed to take behaviour as it is, while nonetheless deriving bottom-up measures of experienced utility and its likely determinants. The critical step is to treat individuals' subjective assessments of the overall quality of their lives as fuzzy measures of their experienced utility. The analyst then faces the job of inferring, from the variety of information available about the circumstances of individual lives, the relative importance of the variety of economic and non-economic aspects of life. This method offers even more than the possibility of testing alternative assumptions or assessments of what produces well-being. As our examples suggest, it also has the potential to improve the empirical foundations of cost-benefit analysis by attaching comparable values to many aspects of life that were previously confined to footnotes because they seemed to defy measurement.

Our view, on the basis of more than a decade of research by us, and much more by many others in a range of disciplines, is that the science of well-being deserves more attention in all the social and caring sciences, from economics, education, and law to health care, policing, urban design and energy policy.

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Appendix

Subjective well-being measures

Cognitive life evaluations

Satisfaction with life (SWL): This question is typically written: "All things considered, how satisfied are you with life as a whole these days?" and answered on a 1-to-10 or 0-to-10 numerical scale with verbal anchoring points ("Completely satisfied", "Completely dissatisfied") at the extremes. Coarser scales may have the advantage of having verbal descriptions for each possible response, but this seems to be outweighed by the benefit of having more resolution in an 11-point scale with anchoring descriptions at the top and bottom.

Cantril ladder: Similar in response format to the 0-to-10 SWL with verbal descriptions at top and bottom, the Cantril "self-anchoring striving scale" poses a different question: "Please imagine a ladder with steps numbered zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?" For some waves, the Gallup World Poll contained both the Cantril ladder and an SWL question, on the same 0 to 10 scale. Helliwell et al (2010) fitted the same model to both sets of data and found essentially identical coefficients, and closer fitting equations if the two measures were averaged.

Satisfaction with life scale (SWLS): Diener et al (1985) argued for the need for a multi-item scale to measure properly life satisfaction as a cognitive-judgemental process. They developed the five-question SWLS index as an alternative to single-item measures. Only one of the questions includes the word "satisfied". The index likely has better statistical properties than a single-item SWL but is, of course, costlier to include on surveys due to its length.

Measures of affect

Happiness: A typical question gauging happiness is "How happy are you at the moment?" with a numerical but verbally-described scale for responses. This question accesses the respondent's more transient affective state, rather than global, longer-term, and more cognitive evaluation of life quality. Helliwell & Putnam (2004) compare happineess and life satisfaction equations for World values survey data, and find them to have very similar structures, with slight differences consistent with the less evaluative nature of the happiness responses.

Self-report depression scales: Some psychometrics for depressive disorders are based on self-report inventories of questions. The 21-question Beck Depression Inventory (Beck 1972, p. 333) and more recently versions of the Patient Health Questionnaire (PHQ) with as few as 6 or even 2 questions are examples.

Positive and negative affect: Rather than treating happiness and unhappiness on a single dimension, series of questions can be used to gauge the incidence or preponderance of exhibited feelings and behaviours associated with positive affect and, as an independent construct, negative affect. One standard set of questions assessing these is the Positive Affect Negative Affect Schedule (PANAS, Watson et al, 1988),

consisting of 10 descriptors for positive affect (attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong and active) and 10 descriptors for negative affect (distressed, upset-distressed; hostile, irritable-angry; scared, afraid-fearful; ashamed, guilty; nervous, and jittery).

Affect balance: A series of multi-item measures of positive and negative affect can be combined in such a way as to create a single index which indicates the balance between the two.

U-index: Kahneman et al (2006) propose and implement a "U-index", and advocate for it as a measure of society's well-being. The index is named for "unpleasant" or "undesirable" and is the proportion of time (aggregated over respondents) in which the highest rated recalled feeling was a negative feeling. This provides a way to compare and aggregate over individuals with idiosyncratic differences in the magnitude scales they use to describe their own affect.

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[1] We use a global (later, national) equation $SWB = X'\beta + \varepsilon$ to estimate a set of "nondiscriminatory" (in the Blinder-Oaxaca parlance) coefficients β^* for use in the decomposition. The mean SWB difference between regions A and B can then be written in terms of the covariates X_A and X_B as a component Q that is "explained" by region differences in X and an "unexplained" component U which captures differences in coefficients from estimates carried out separately on each region, as well as differences in unobserved variables:

$$\Delta SWB = Q + U$$

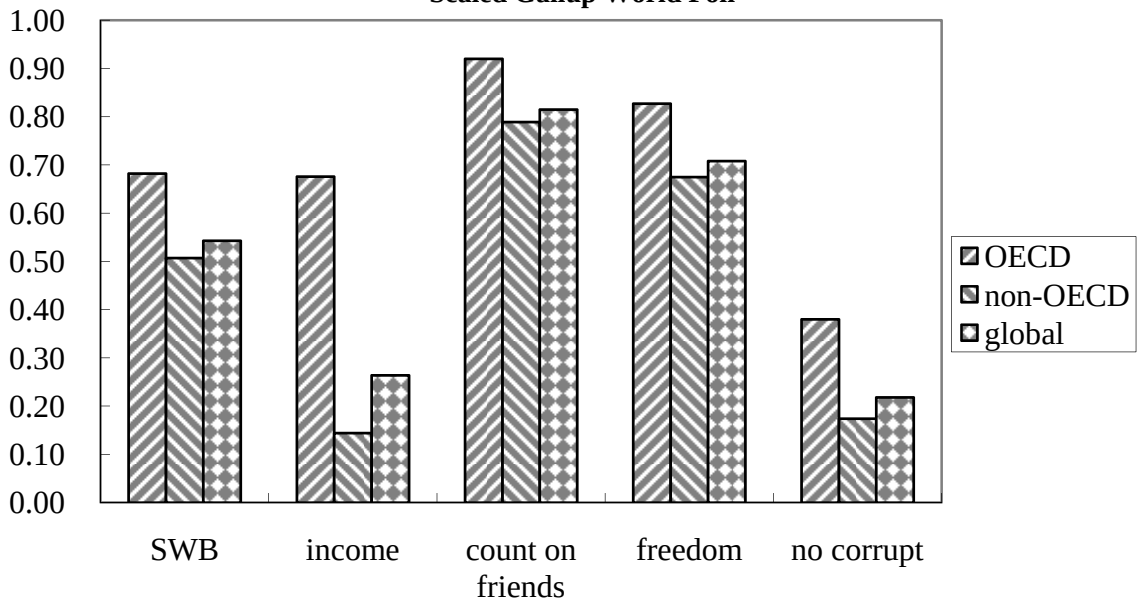
$$Q = \left[E\left(X_A\right) - E\left(X_B\right) \right]' \beta^*$$

$$U = E\left(X_A\right)' \left[\beta_A - \beta^* \right] + E\left(X_B\right)' \left[\beta^* - \beta_B \right]$$

[2] To ease the interpretation of the figures, the coefficients on the two-region pooled OLS equation for life satisfaction are .39 (t=10.7) on log household income, .48 (t=3.9) on trust in neighbours, .48 (t=4.0) on confidence in police, .06 (t=3.3) on the log frequency of seeing friends, 1.16 (t=9.5) on belonging to community, and .61 (t=5.3) on belonging to province.

Figure 1: Comparing life in the OECD and non-OECD countries

Scaled Gallup World Poll



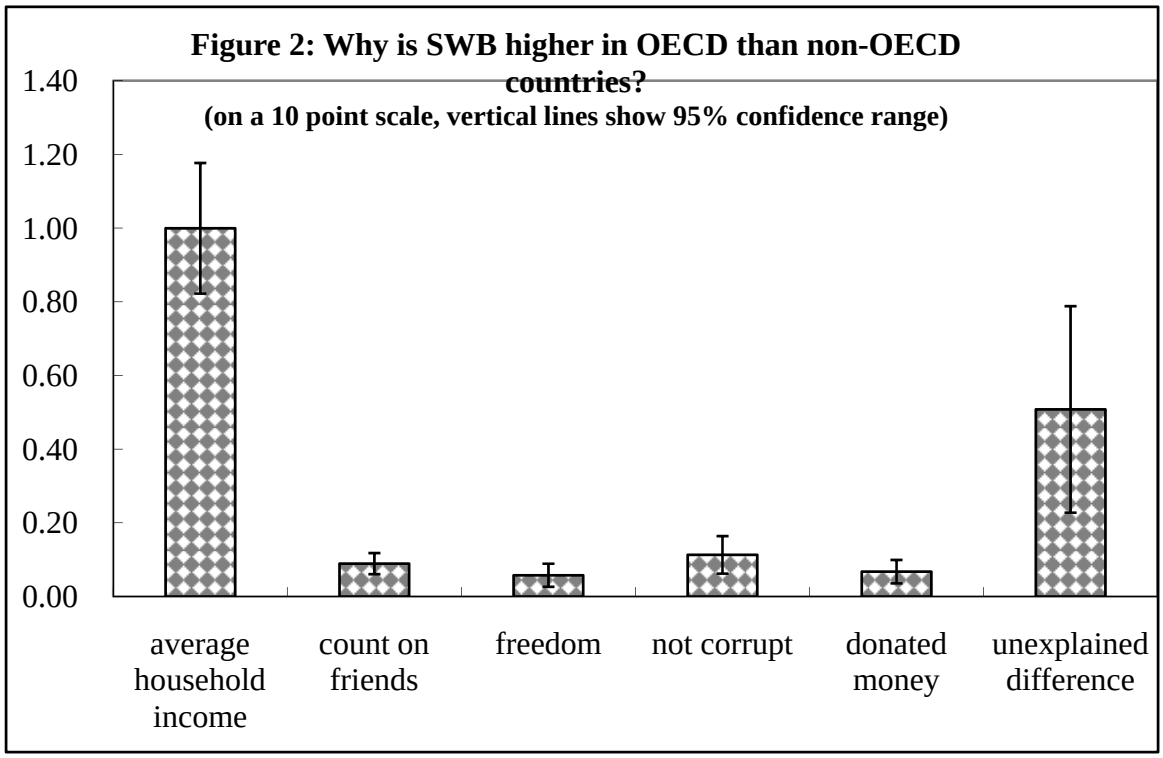


Figure 2: Why is SWB higher in OECD than non-OECD countries?
(on a 10 point scale, vertical lines show 95% confidence range)
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
average household income
count on friends
freedom
not corrupt
donated money
unexplained difference

Figure 3: Coefficients in the OECD and non-OECD countries
Gallup World Poll

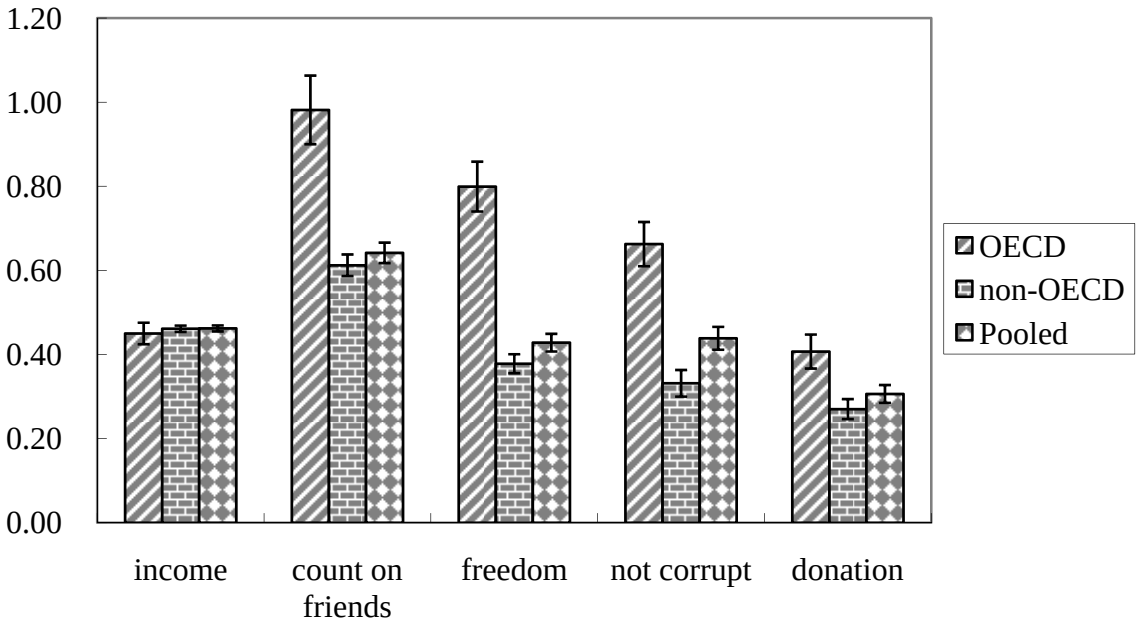


Figure 4: Comparing life in the Atlantic Provinces with life in BC

Scaled Average Data from GSS17

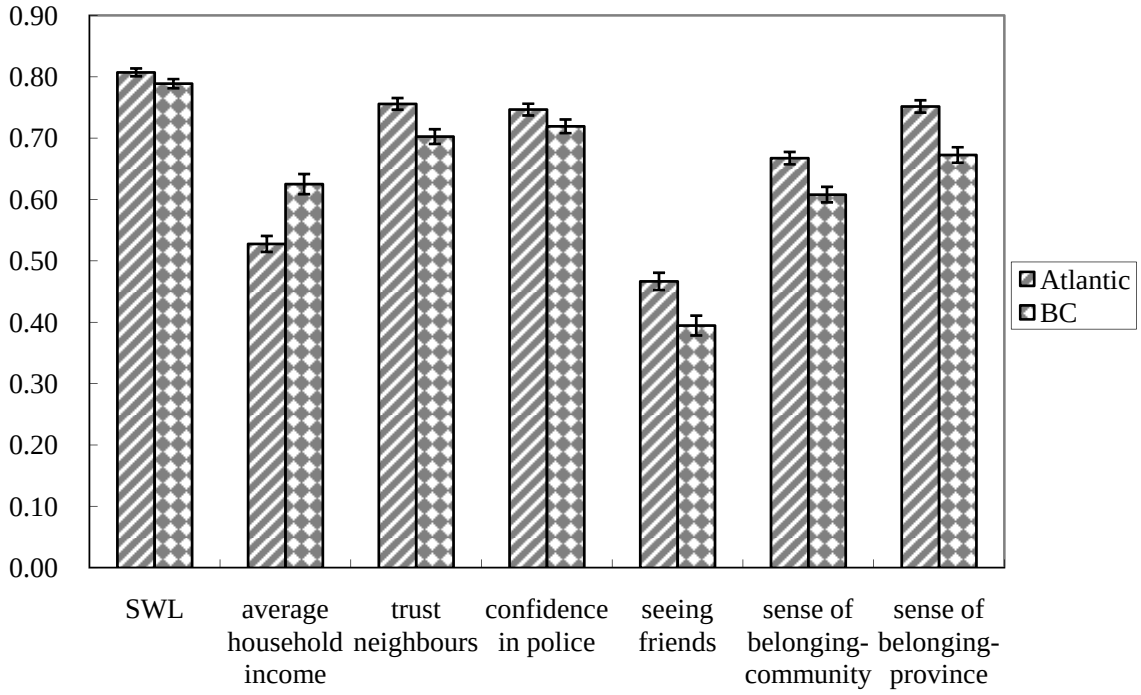


Figure 5: Why is average life satisfaction higher in the Atlantic Provinces than in BC?