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INCOME OR CONSUMPTION: WHICH BETTER PREDICTS SUBJECTIVE WELL-BEING?

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The positive relationship between income and subjective well-being has been well documented. However, work assessing the relationship of alternative material well-being metrics to subjective well-being (SWB) is limited. Consistent with the permanent income hypothesis, we find that a consumption-based measure out-performs (surveyed) income in predicting subjective well-being. When objective measures of consumption are combined with self-assessments of a household's standard of living, income becomes insignificant altogether. We obtain our result utilizing household-level data from Statistics New Zealand's *New Zealand General Social Survey* which contains measures of income, SWB and a measure of material well-being called the *Economic Living Standard Index* that combines measures of consumption flows and self-assessments of material well-being.

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1. INTRODUCTION

We examine whether surveyed income or a consumption-based measure better predicts subjective well-being (SWB) where SWB is measured by an officially surveyed question on how people feel about their life. In this context, SWB may be considered as a proxy for utility. Since its inception, economics has attempted to understand the relationship between utility, consumption and income. Unlike Adam Smith (1776), who focused on consumption as a goal or John Stuart Mill (1863) who focused on happiness (utility) as a goal, twentieth century policy-makers tended to focus more on increasing measures of national production, such as Gross Domestic Product (GDP) or national income measures such as Gross National Income (Jaszi, 1986) in setting economic policy.

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Economists commonly model utility *inter alia* as a function of consumption which is maximized subject to a budget constraint. The budget constraint incorporates current and future income, wealth and prices. One lens through which to understand our study is that it is an evaluation of whether a direct measure of consumption (a component of the utility function) out-performs current income (a component of the budget constraint) in proxying utility.

The limitations of measures such as GDP as indicators of well-being have been systemically documented (Stiglitz *et al*., 2009; hereafter SSF) leading to increased interest in holistic well-being measures. SWB is one such conceptual framework for measuring quality of life. One set of SWB metrics is collected by directly asking individuals to evaluate their happiness / life satisfaction, either as a whole or in particular domains (e.g. health, work) (Boarini *et al.,* 2006). Developments in psychology and behavioral economics have increased confidence in the use of such metrics (Kahneman *et al.,* 1997). Many studies have presented supporting evidence demonstrating that surveyed life satisfaction is a reliable and valid measure of well-being (Layard, 2011; Helliwell *et al.,* 2013). Other measures of "happiness" such as positive and negative affect concentrate more on shorter term emotions, whilst eudaimonic measures of life purpose are more relevant to personal life choices (OECD, 2013b).[1] While these well-being concepts differ from one another, several studies show that they are positively correlated (e.g. Delhey and Kroll, 2013). We focus on evaluative well-being (life satisfaction) as our measure of SWB.

Our approach has been shaped by the recommendations of SSF for the measurement of well-being. Three of their key recommendations are: 1) to concentrate on consumption and wealth over production; 2) to emphasize the household perspective rather than the individual; and 3) to utilize subjective measures of well-being. The data contained within the New Zealand General Social Survey (hereafter NZGSS) enable us to pursue certain implications of these recommendations. Specifically, NZGSS contains a measure called the "Economic Living Standard Index" (hereafter ELSI), a consumption-based measure of living standards. ELSI assesses a household's level of consumption and, to a lesser extent, wealth via a combination of objective and self-rated questions.

Our central research question is to ascertain which of two measures of material well-being—household income or ELSI—better predicts subjective well-being. The correlation between life satisfaction and income is well established (Kahneman and Deaton, 2010). The novelty of our approach is to assess if a proxy for consumption (ELSI) is more informative. There are four factors that suggest that ELSI may prove superior: First, Friedman's permanent income hypothesis postulates that current consumption is determined by lifetime resources, and thus current consumption should be a better indicator than current income of lifetime living standards (Friedman, 1957). Second, Deaton (amongst others) has demonstrated the veracity of self-rated measures of material well-being (Deaton, 2010 and 2016). The ELSI indicator that we use includes subjective responses relating to income adequacy in line with Deaton's findings. (We test our relationships using both the

[1]To illustrate the concepts, a surgeon may feel unhappy because a patient dies but still believe that their life has purpose. They may be satisfied with their life as a whole possibly because happy moments outweigh unhappy moments across their life and also because of their high degree of life purpose.

full ELSI indicator that includes these subjective responses and with a version of ELSI that strips out the subjective elements.) Third, as discussed further in the data section below, income may be measured (through the respondent's recall) more poorly than is consumption. Fourth, the interaction of the tax and transfer system with household income may differ across household types making for a complex relationship between household income and life satisfaction.

Inclusion of the self-rated aspects of well-being within ELSI may make the ELSI measure a better proxy for SWB than income both for the substantive reasons identified by Deaton and for statistical reasons. In particular, the similar response scales used for these self-reports and for the SWB question may result in subjects responding in the same (or similar) way to each of the questions. In order to abstract from this potential issue, we split the ELSI measure into two components ("Subjective ELSI" and "Objective ELSI") to assess the individual contributions of each component to predicting SWB, alongside reported income. While there may be a temptation to further deconstruct ELSI into its specific components to examine their individual contributions to SWB, we do not do so for a number of reasons. First, the index was compiled to be an integrated measure of living standards, and disaggregation into constituent components would undermine the conceptual approach that underpinned its construction. A related technical point (discussed further in Section 4) is that the index is not a simple linear combination of items, so disaggregation is not a simple exercise.[2] In addition, disaggregation for the purpose of isolating particular significant indicators would inevitably descend into a data-mining exercise that would make interpretation of findings difficult.

We find, over all samples and testing methods, that ELSI is a more reliable and informative predictor of life satisfaction than is income. When both are included in the same regression, income is almost always insignificant, whilst ELSI is always significant. For some samples, this result is dependent on the presence of ELSI's self-rated (subjective) components. When stripped out, and income is compared with the "objective" (pure consumption) elements of ELSI, consumption remains significant (at the one percent level) while income is significant at the ten percent level (but not at five percent); furthermore income remains insignificant for a number of sub-samples including people aged under 30, those on the lowest incomes, and Māori (the indigenous inhabitants of New Zealand, comprising approximately 15 percent of the population). Our regressions control for other personal characteristics (e.g. age, gender, employment), and the estimated relationships between life satisfaction and these characteristics are consistent with the literature's consensus. Thus, our central result is unlikely to be caused by any anomalies within the NZGSS sample.

The remainder of the paper is structured as follows. Section 2 reviews relevant literature, Section 3 presents our methodology and hypotheses, while Section 4 presents the data. Section 5 presents our core results and Section 6 presents sensitivity analyses to test the robustness of the core results. Section 7 concludes.

[2]We deal with this issue explicitly when we disaggregate the index into two sub-components, Subjective and Objective ELSI (see section 4); further disaggregation would pose more significant technical issues.

2. Related Literature

2.1. *Material Well-being*

There is a wealth of evidence confirming the positive cross-sectional relationship between (the logarithm of) income and life satisfaction. This relationship holds for both intra- and inter-country comparisons (Easterlin, 1995; Diener and Biswas-Diener, 2002; Stevenson and Wolfers, 2008; Kahneman and Deaton, 2010). Between countries there is a strong correlation between GNI *per capita* and other measures of well-being such as life expectancy (Grimes *et al.,* 2014). Thus, it is well accepted that people who earn more tend to have higher well-being, once other factors are controlled for. Relative income (as well as absolute income) may also be an important determinant of life satisfaction (Easterlin, 1974, 1995) and we explore one avenue by which this factor may affect our results.[3]

There is also a growing body of literature that utilizes consumption as an input for the construction of aggregate measures of well-being (Kahneman *et al.,* 1997; Jones and Klenow, 2016; Attanasio *et al.,* 2015; Grimes and Hyland, 2015). These studies demonstrate that consumption-based measures of well-being correlate well with other objective measures of living standards such as GDP and life expectancy.

The ELSI metric, developed by New Zealand's Ministry of Social Development (MSD), is intended as a "broad spectrum measure [of living standards] for the whole population." It is based on consumption, household amenities and social activities rather than income (Jensen *et al.,* 2005). The measure includes both objective and subjective components. The objective components (75 percent weighting) are direct assessments of consumption (e.g. does the house have a washing machine), whereas the subjective elements (25 percent weighting) focus on the perceived adequacy of the household's material situation. The inclusion of subjective elements is motivated by the idea that people are the best judge of their own circumstances. The reliability of these self-reported income assessments has been attested to in studies across a number of countries (Deaton, 2010, 2016 and 2018). In addition, the subjective elements assist in discriminating between individuals' living standards for those with higher levels of well-being (Perry, 2015).

Neither market consumption nor income measures explicitly account for non-market activities (Stone, 1986). To address this shortcoming, there have been attempts to improve income measurement to incorporate taxation and government transfers (both cash and in kind) but the adjusted measures are still limited in adequately valuing government services. Moreover, they omit services produced by the household (or by friends and family), which may play an important role in providing the household with resources (SSF). The construction of ELSI avoids this difficulty by including non-market activities in its composition (Perry, 2015).

The ELSI measure focuses on the actual living standards that households are able to realize. The material well-being provided by an item is considered the same, irrespective of its (local) market price. Deaton (2008) and Grimes and Hyland

[3]Given that we employ cross-sectional data, we do not delve into inter-temporal relationships.

(2015)[4] emphasize the difficulties of making comparisons of real income between countries. Comparisons are exacerbated by the presence of disparate relative prices and complexities involved in the valuations of government and housing services, both internationally and inter-regionally. This regional issue is addressed in our research by testing relationships across regions within New Zealand, so accounting for variations in the cost of living and relative prices of key items such as housing.

No proxy of consumption will account perfectly for the nuances inherent in the utility functions and preference orderings of a diverse population. As such, the items that compose ELSI (and similar indices) are not a definitive list of a household's necessities and freedoms. They are intended as a balanced set of items to illuminate different levels of material well-being between households (Perry, 2015). Measurement bias may be introduced either through the omission of key items or incorrect calibration within an index, or through diversity of preferences. one approach to deriving a representative consumption metric is to ask people what is important to them. Europe's "EU-13" index, a 13-item material deprivation index (Guio *et al.,* 2017) which is similar in concept to ELSI, is informed by Mack and Lansley's (1985) "consensual approach to identify necessities". This index classifies a "socially perceived necessity" as any "item regarded as necessary by at least 50 percent of interviewees".

Nevertheless, even with such an approach, it is important that any index is tested not only for the entire population, but also for subsections within it. ELSI (and similar indices) was developed, in part, to compare levels of deprivation amongst poor households, given the inadequacy of income measures for this group. This deprivation focus could limit ELSI's applicability as a material well-being measure for upper income households (Perry, 2015). In spite of this, our core result holds even when tested on the top quartile of materially well-off households.

Following Alesina and Giuliano (2015), Grimes *et al.,* (2015) demonstrate that some differences in economic values and beliefs exist between Māori and non-Māori segments of New Zealand's population. Accordingly, any measure that intends to assess the material well-being of the population should also be robust to potential differences for Māori relative to non-Māori. Again, our core result holds when tested across different ethnic groups, indicating that our results have general applicability and do not apply just to certain segments of society.

2.2. *Subjective Well-being*

We focus on evaluative well-being as a holistic (and informative) measure of an individual's well-being (Kahneman *et al.,* 1997 and 2006). A typical evaluative well-being question asks individuals to place themselves on a scale in relation to how they feel about their life as a whole. The importance of life satisfaction as an indicator of welfare—relative to other measures that are relevant to specific aspects of welfare—is evident from responses regarding the OECD's Better Life Index (BLI) which comprises 11 domains intended to constitute aspects of overall

[4]Grimes and Hyland (2014) established a cross country measure, the Material Wellbeing Index (MWI), based on the ownership of a standardised set of consumer durables across countries.

welfare.[5] Visitors to the BLI webpage are encouraged to rank these components in order of importance to them. New Zealand respondents rank life satisfaction as the most important element of overall well-being amongst these domains.[6]

The notion that individuals are reliable evaluators of their own well-being has a long philosophical tradition (SSF, 2009) reinforced by modern developments in psychology and behavioral economics (Kahneman *et al.,* 1997; Frey and Stutzer, 2002; Kahneman and Krueger, 2006; Layard, 2011). A positive relationship has been established between life satisfaction and objective metrics. Deaton (2008) demonstrates the positive relationship between life satisfaction and health. For the United States, Oswald and Wu (2010) illustrate a significant relationship between objective measures of well-being across states and their average life satisfaction. Grimes *et al.,* (2014) find that SWB (measured using life satisfaction from the World Values Survey) is a significant factor in migration decisions, which links subjective well-being to a revealed preference outcome.[7] Nevertheless, well-being is a multi-dimensional concept that depends on a broad range of objective conditions and capabilities (Sen, 1985) and we make no claim that life satisfaction is the only aspect of well-being that is relevant to individuals or society.

3. Methodology and Hypotheses

We first outline the estimation methods we use to test the relationships between SWB (life satisfaction) and two measures of objective welfare: ELSI and household income. We also outline the factors that we control for in our estimates, and discuss potential limitations imposed on our analysis due to the use of a cross-sectional dataset.

In the 2012 NZGSS, life satisfaction is recorded as the response to the question: "How do you feel about your life as a whole right now?" It is measured on a 5-point scale: 1 = very dissatisfied; 2 = dissatisfied; 3 = no feeling either way; 4 = satisfied; 5 = very satisfied.

Use of the scale implicitly assumes ordinal comparability for each individual, i.e. each respondent agrees that dissatisfied is better than very dissatisfied, etc. To employ an estimation technique such as Ordinary Least Squares (OLS), we need to further assume consistent cardinal comparability across individuals, i.e. that the difference between 1 and 2 is the same as the difference between 4 and 5 for each individual, and that the same scale of measurement is used across all individuals. If these assumptions are not made, an ordered logit (or probit) model is more appropriate. Ferrer-i-Carbonell and Frijters (2004) detail a theoretical basis for the cardinal comparability assumption. They find that OLS and ordered probit (and logit) models yield similar results in terms of coefficient signs and significance. Luttmer (2005) also obtains this result. Following their lead, we use OLS for our base model, but test robustness by estimating ordered probit and ordered logit models, obtaining similar results in all cases.

[5]The domains are: housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance.

[6](N = 779); data accurate as at March 23, 2017. See: http://www.oecdbetterlifeindex.org/responses/#.

[7]Studies that address the reliability of SWB over time (e.g. Krueger and Schkade, 2008) conclude that life satisfaction's signal-to-noise ratio is sufficient to enable reliable empirical studies.

One further assumption that we make (along with most other studies in this field) is that material well-being is not endogenous with respect to life satisfaction (Oswald *et al.*, 2015). Our data do not enable us to test this assumption and so our results should be interpreted as presenting associative, rather than necessarily causal, relationships between subjective well-being and alternative objective indicators of material well-being.

We start with a relationship in which individual i's utility (U_i) is expressed as a function of that individual's consumption (C_i) and the individual's characteristics ($\boldsymbol{\alpha_i}$) plus a random term (ε_i):

$$U_i = u_i\left(C_i, \boldsymbol{\alpha_i}\right) + \varepsilon_i \tag{1}$$

where u_i (.) has the standard properties of a utility function. We break the characteristics vector, $\boldsymbol{\alpha}$, into four separate vectors: **D**, a vector of an individual's exogenous demographics (e.g. gender, age, ethnicity); **X**, a vector of observed individual chosen characteristics (e.g. employment, relationship status); **Z**, a vector of self-reported individual characteristics (e.g. assessment of health); and $\boldsymbol{\gamma}$, a vector of unobserved individual characteristics (e.g. genetics). **D**, **X** and **Z** vary from characteristics considered to be exogenous for the individual (**D**) to those that may well be co-determined with life satisfaction (**Z**). The inclusion of **D**, **X** and **Z** limit the potential for omitted variable bias. With respect to **Z**, positive self-assessments (e.g. of health) may contribute directly to life satisfaction. They may also reflect the personality (e.g. the inherent optimism or pessimism) of an individual (Dolan *et al.,* 2008). Inclusion of measures such as self-assessed health as control variables therefore help to mitigate the possible presence of shared method variance that may arise from inclusion of multiple self-report questions being included within a cross-sectional study (OECD, 2013b).[8] We test our relationships by successively adding these characteristics vectors as a test for robustness.[9]

Equation (1) has no role for income since the budget constraint is already reflected in C_i. Typically, in the absence of consumption data, estimates of the determinants of life satisfaction include the logarithm of income, (Diener and Biswas-Diener, 2002; Helliwell, 2003; Deaton, 2008). In our tests of the role of income, we follow the norm of using log (income), equivalized for household composition, though we also include tests using alternative functional forms for income, obtaining similar results. We estimate an encompassing equation in which life satisfaction (LS_i) is regressed against (log) income (y_i), consumption (with ELSI initially used to proxy C_i) and personal characteristics as shown in (2), where β_4, β_5 and β_6 are all vectors:

$$LS_i = \beta_1 + \beta_2 \ln(y_i) + \beta_3 C_i + \beta_4 \boldsymbol{D_i} + \beta_5 \boldsymbol{X_i} + \beta_6 \boldsymbol{Z_i} + \varepsilon_i \tag{2}$$

Following our OLS regression of this equation, we undertake a battery of robustness checks that include: alternatively excluding the income and ELSI terms to

[8]In particular, see the discussion (in Section 4.2 of OECD, 2013b) of 'Self-report measures and shared method variance'.

[9]As we are using cross-sectional data, we cannot estimate $\boldsymbol{\gamma}$. There is the possibility that estimated coefficients are biased if elements of $\boldsymbol{\gamma}$ are correlated with other independent variables; however we have no reason to believe that this is the case here, particularly with the inclusion of the **Z** vector.

test relationships independently as well as together; testing the relationship with different groups of control variables; running Ordered Probit and Ordered Logit regressions; running split sample regressions with splits according to age, ethnicity, region, ELSI quartiles and income quartiles; varying the functional form of income; and varying the method of household income equivalization. Finally, we split ELSI into its objective and its subjective components, and include each component separately to test their respective links with SWB (and income).

Our primary research question is to understand which objective measure of material well-being (either household income or ELSI) better predicts life satisfaction. First, we test the significance of ELSI when income is excluded, with the null (H_0) and alternative (H_1) hypotheses within equation (2) being:

$$H_0{:}\beta_3 = 0, \quad H_1{:}\beta_3 > 0$$

Second, we test the significance of income when ELSI is excluded:

$$H_0{:}\beta_2 = 0, \quad H_1{:}\beta_2 > 0$$

Third, we test whether ELSI is significant for improving individual happiness conditional on household income being included in the regression:

$$H_0{:}\beta_3 = 0, \quad H_1{:}\beta_3 > 0 \quad | LS_i = f(y_i, \dots)$$

Fourth, we test whether household income is significant for improving individual happiness conditional on ELSI being included in the regression:

$$H_0{:}\beta_2 = 0, \quad H_1{:}\beta_2 > 0 \quad | LS_i = f(C_i, \dots)$$

Our theoretical priors (reflecting the permanent income hypothesis and the work of Deaton) is that we should expect to reject $\beta_3 = 0$ but not to reject $\beta_2 = 0$ when we include both income and ELSI in the same regression. If these priors were supported, we could conclude that once consumption and self-assessments are controlled for, income has no impact on an individual's level of happiness. When we split ELSI into its objective and subjective components, we further test whether $\beta_2 = 0$ if self-rated assessments are variously excluded or included.

To interpret the estimates that follow, we note that a one percent increase in income is associated with a $\beta_2/100$ increase in life satisfaction on the five point scale, whereas an increase of ELSI by one unit is associated with a β_3 increase in life satisfaction.

4. Data

4.1. *Data Source*

The data source for our analysis is the 2012 wave of the New Zealand General Social Survey (NZGSS). Statistics New Zealand (SNZ) carries out this biennial cross-sectional survey of ~8500 individuals. The survey had a 78 percent response

rate. It collects responses on a wide range of potential determinants of life satisfaction. The data from the NZGSS comes to us as a confidentialized unit record file (CURF). SNZ have modified the raw data to protect the privacy of respondents. The dataset either redacts some confidential details (e.g. location[10]), or assigns them to bands (e.g. income, age).[11]

Ordering of questions within NZGSS is shown by the following sequence of modules: Core personal questions (including demographic information and household income), overall life satisfaction, health, knowledge and skills, paid work, ELSI, housing, physical environment, safety and security, support across households, social connectedness, leisure and recreation, culture and identity, human rights. The sequence indicates that our dependent variable (life satisfaction) is surveyed just after the income question and prior to the ELSI questions. To the extent that responses to life satisfaction may be "contaminated" by the ordering of questions, this suggests that there could be a positive bias towards income as being correlated with SWB; in contrast, there is no reason to expect bias in relation to the relationship between SWB and ELSI.

4.2. *Control Variables*

Tables A1 to A3 present and define the variables contained within the control variable vectors **D**, **X** and **Z**, together with their sample means.[12] They cover most of the determinants of life satisfaction that are commonly included in related studies.

In Table A2, NZDep (New Zealand deprivation), is an index of local area deprivation.[13] It assigns a deprivation score to each "meshblock" in New Zealand. Meshblocks are geographical units defined by SNZ as containing a median of 87 people, akin to a city block in urban areas. It is presented as an ordinal scale from 1-10, where 1 = least deprived and 10 = most deprived. This effectively separates meshblocks into deciles of deprivation (e.g. a value of one is assigned to a meshblock in the least deprived ten percent areas of New Zealand). The index is based on the proportion of people within the meshblock experiencing some degree of deprivation where inputs into its calculation include the proportion of people who are unemployed, have no qualifications, have no access to basics such as a telephone or a vehicle, or who are living below a given income threshold.

We include NZDep as a single (cardinal) variable in equation (2) to help control for variations in material well-being within regions. This is especially useful given the broad nature of the "region" category within the NZGSS. Its inclusion also enables us to make inferences about how an individual's living standard relative to close neighbors affects the individual's life satisfaction.

[10]Location is grouped into six broad regions.

[11]See: http://www.stats.govt.nz/tools_and_services/microdata-access/confidentialised-unit-record-files.aspx.

[12]All variables other than the regional deprivation variable (NZDep) are dummy variables, so only means are presented indicating the proportion of the sample with that characteristic. (The standard deviation of NZDep is 2.86).

[13]The NZGSS 2012 wave includes the 2006 census version of this index. See NZDep 2006 user manual: http://www.otago.ac.nz/wellington/otago020337.pdf.

4.3. *Household Income*

The NZGSS household income question is: "In the last 12 months what was your total household income, before tax or anything else was taken out of it?" Responses are measured across 15 closed income bands and one open-ended upper income band (plus "Don't Know" and "Refused").[14] The question is introduced by the statement: "The next questions are about people in this household and their income," followed by the question: "Looking at showcard C6, what are all the ways that your household got income in the last 12 months ending today? You can choose as many as you need." The showcard then lists 14 different potential sources of income (including wages, self-employed earnings, investment income and rents, regular insurance payments, and a range of government benefits). Thus subjects are prompted to respond with a comprehensive measure of annual household post-transfer (but pre-tax) income.

We omit observations from our dataset where responses were for loss, zero income, don't know or refused.[15] Social assistance payments (including the universal pension, New Zealand Superannuation[16]) should mean that few people are in the bottom three income bands. In practice, the survey shows 4.6 percent of people with positive income to be within these bands. Some of these may be self-employed, some may not be eligible for social assistance (e.g. part-time workers, some students, and unemployed people who are not seeking work) while others may be subject to inaccurate recall. In our robustness checks, we split the sample according to income quartiles. This enables us to check if our results differ for those in the bottom reported income quartile relative to the other quartiles, potentially indicating concerns about data quality. (When we do so, results for the bottom quartile are similar to those of other quartiles suggesting that this is not a major cause for concern).

We take the midpoint for all income responses other than those in the top (open-ended) response category. Most studies have found that this is a reasonable approximation of the real data (Ligon, 1989) and we note that most of our bands are very narrow. For the open-ended top response category, we follow Parker and Fenwick (1983) and utilize the Pareto Curve to estimate the median of the open ended category as $200,000.[17]

While this income question is typical of household surveys, there are three potential issues which could lead to inaccuracy in response. First, the use of income bands means that (even with perfect recall) most incomes will be inaccurately recorded as being at the band mid-point rather than at the true value; however the use of narrow income bands for most of the population helps to mitigate this issue. Second, respondents in many households are unlikely to recall accurately (or even to know) total household income for two reasons: (a) a person may not accurately

[14]The 16 bands are: Loss; Zero income; $1 - $5,000; $5,001 - $10,000; $10,001 - $15,000; $15,001 - $20,000; $20,001 - $25,000; $25,001 - $30,000; $30,001 - $35,000; $35,001 - $40,000; $40,001 - $50,000; $50,001 - $60,000; $60,001 - $70,000; $70,001 - $100,000; $100,001 - $150,000; $150,001 or more. In 2012, the average NZ dollar to US dollar exchange rate was: 1 NZD = 0.81 USD.

[15]We do this also for similar responses to other key questions (e.g. ELSI, age). This results in ~400 excluded respondents from our original dataset, leaving 8048 observations.

[16]The annual gross rate for New Zealand Superannuation as at 1 April 2012 was $20,860 p,a. for a single person living alone.

[17]The actual result was $202,398, which we rounded to $200,000.

recall their own annual income, and (b) they may not know the income of others in their household. Third, the question asks for gross income from all sources. Some government transfers are explicit while others are received by way of tax rebate, and it is unclear how the latter are treated by respondents. Furthermore, disposable income (which is not surveyed) is likely to be the more relevant income concept for our purposes. For these reasons, we expect a degree of inaccuracy in the surveyed income responses. In turn, these inaccuracies—even if leading to unbiased responses—will cause attenuation bias in our statistical estimates. We return to this issue when interpreting our results in the Conclusions.

Once we have converted the household income responses from bands into values, we need to control for the number and type of occupants within each household. Our principal method for doing so is based on the "Modified OECD scale" used by OECD and Eurostat (OECD, 2013a). The "Modified OECD scale" is designed to take into account economies of scale in household composition. It divides household income by a weighted sum of its inhabitants, assigning a weight of one to the first adult, 0.5 to subsequent adults and 0.3 to each child.

Three alternative equivalization scales are sometimes used in other studies. These three approaches are: (1) The old OECD household income equivalization method sometimes referred to as the "Oxford Scale." This is the same as the "Modified" scale, except it places a higher weighting on every subsequent adult after the first occupant (0.7) and each child living in the house (0.5); (2) The Square Root method, where household income is divided by the square root of the number of occupants, regardless of their age. This method may be employed when there is no data on the age of household occupants (for example, Grimes and Hyland, 2015); and (3) The Per Person equivalization method, where household income is divided by the total number of occupants. This method is relatively crude and employed less often. In Section 6 we show that our results are robust regardless of the equivalization method chosen.

4.4. *Economic Living Standards Index (ELSI)*

ELSI is an index created by New Zealand's Ministry of Social Development (MSD), designed to serve as a measure of a household's material living standards (Jensen *et al.,* 2002). It was developed in the recognition that while income is correlated with other living standards measures, the correlation is typically quite low (Townsend, 1979; Mack and Lansley, 1985).[18] The index was not designed explicitly to capture broader quality of life indicators such as SWB or Sen's (1985) capability approach to well-being. Conceptually, ELSI was designed to improve on income as a measure of material living standards and to have broader coverage than deprivation measures by including consumption components relevant for living standards at higher levels of household resources (e.g. overseas holidays). The key challenge in the design of such a measure is to account for different preferences for such items, and we discuss below how this was addressed.

There are two versions of ELSI. The one used in the NZGSS is ELSI "Short-form" which contains 15 fewer items than the full ELSI metric. Whenever we refer

[18]Similar measures (e.g. that of Townsend, 1979) tend to focus on measures of deprivation, surveying subjects on items for which an absence would indicate a materially deprived household.

to ELSI in this paper we are referring to the "short-form" version. In our description below, we draw heavily upon Jensen *et al.,* (2002 and 2005) and Perry (2015). ELSI contains three key elements:

Essentials

This element, having a maximum score of 14, is an assessment of the forced lack of essentials for the household. Respondents receive one point for each item they possess or consume, and also receive one point if they do not possess or consume this item based on choice. They receive 0 points if cost has driven the lack of possession or consumption of the item. This section contains 14 items (seven goods, seven services/activities):

(i) Telephone
(ii) Washing machine
(iii) Heating available in all main rooms
(iv) A good pair of shoes
(v) A best outfit for a special occasion
(vi) Personal computer
(vii) Home contents insurance
(viii) Give presents to family or friends on birthdays, Christmas or other special occasions
(ix) Visit the hairdresser once every three months
(x) Have holidays away from home every year
(xi) Enough room for family to stay the night
(xii) Have a holiday overseas at least every three years
(xiii) Have a night out at least once a fortnight
(xiv) Have family or friends over for a meal at least once a month

Economizing

This element, having a maximum score of 16, is an assessment of the extent to which a household has economized or cut back its expenditure. Respondents are asked: "have you done any of these things not at all, a little, or a lot?" They are given two points if they answer "not at all," one point for "a little" and zero points for "a lot". They are presented with the following eight common methods of economizing household expenditure:

(i) Gone without fresh fruit and vegetables to help keep down costs
(ii) Continued wearing clothing that was worn out because you couldn't afford a replacement
(iii) Put off buying clothes for as long as possible to help keep down costs
(iv) Stayed in bed longer to save on heating costs
(v) Postponed or put off visits to the doctor to help keep down costs
(vi) Not picked up a prescription to help keep down costs
(vii) Spent less time on hobbies than you would like to help keep down costs
(viii) Done without or cut back on trips to the shops or other local places to help keep down costs

Self-Assessments

In the third element, having a maximum score of 11, individuals are asked three self-assessment questions about their household income and standard of living. The questions are, with points per question given in parentheses:

(i) Generally, how would you rate your material standard of living? Would you say that it is high, fairly high, medium, fairly low or low? (High = 4, Low = 0);

(ii) Generally, how satisfied are you with your current material standard of living? Would you say you were very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied or very dissatisfied? (Very satisfied = 4, Very dissatisfied = 0);

(iii) How well does your (and your partner's combined) total income meet your everyday needs for such things as accommodation, food, clothing and other necessities? Would you say you have not enough money, just enough money, enough money, or more than enough money? (More than enough = 3, Not enough = 0).

Responses to all the items are summed to form a total score. Any total score with a value less than ten is set equal to ten to truncate the outliers, and then ten is subtracted from each respondent's total score. This truncation procedure applies to 0.5 percent of observations. Respondents with the lowest possible standard of living have an ELSI score of 0 while the maximum possible ELSI score is 31 (=14 + 16 + 11 − 10). In order to formulate this scale, the index designers calibrated responses for a range of households some of whom were clearly deprived in terms of basic consumption items, while others had the resources to afford a range of non-basic (luxury) items. The calibration used both statistical correlations and validation against a series of household vignettes.[19]

We note the conformity of this measure to the recommendations of SSF. It is a measure of consumption and, to some extent, wealth; it incorporates both subjective and objective assessments of well-being; and it focuses on the household perspective. In addition, as recommended by SSF, it accounts for non-market activities and government services.[20]

When considering ELSI's composition, we note that the first two elements ("Essentials" and "Economising,") comprise measures of household consumption, while the third element is a self-assessed (subjective) standard of living. We refer to the combination of the first two elements as "Objective ELSI" and the third element as "Subjective ELSI." It is not possible to directly observe the weighting between these two constituent components within a given ELSI score due to the final step in its calculation;[21] however, generally the objective component

[19]For examples of vignettes, see Jensen *et al.* (2006) pp. 30-38.

[20]MSD has since replaced ELSI with a new measure, the Material Wellbeing Index (MWI). Similar to ELSI, this index is a full spectrum assessment of an individual's material well-being. The two key differences are: 1) MWI contains fewer items, the new version in the NZGSS contains 9 items whereas ELSI contains 25; and 2) MWI is designed to be more effective at tracking changes over time with a greater focus on 'freedoms' (desired non-essentials) rather than on self-assessments (Perry, 2015).

[21]The final step in the index calculation is to deduct 10 from the sum of the three elements (to truncate outliers) but one cannot explicitly attribute those 10 points to just one (or two) of the elements.

comprises around 75 percent of the total score with the subjective element supplying the remaining 25 percent.

The items in Objective ELSI represent both consumption flows (e.g. hairdresser appointments), and items that are part of a household's balance sheet (e.g. consumer durables and spare bedroom). They range from the most basic of needs (e.g. healthcare, housing, clothing), to "freedoms" (e.g. vacations, hobbies), which helps ELSI serve as a broad spectrum measure of consumption that is relevant to well-being across households. The measure does not account for quantity or quality of items which may differ between households. The "economizing" section serves partially to offset this by allowing households to rank their degree of economizing across a range of activities.

A key advantage of the approach adopted with respect to the Objective ELSI items is the ability to go beyond a purely additive approach. In the "essentials" section households are asked why they do not consume a given item. If it is simply not valued by the household, they still get the point for it. Conceptually, this provides a more accurate picture of "true" demand (willingness and ability to pay) than simply accounting for whether the item is consumed or not. Again, however, accuracy of response is a potential issue. For instance, a person who does not possess a computer because they cannot afford one (and who may, consequently, not know the benefits derived from owning one) may respond that their lack of ownership is due to choice. This could lead to an over-estimation by ELSI of the household's material standard of living.

The inclusion of the self-assessments within the ELSI measure means that ELSI is not purely an objective consumption measure. These explicitly subjective elements within ELSI have theoretical advantages and disadvantages. One advantage is their focus on the adequacy of income and living standards rather than merely on measuring income. Thus a superannuitant (pensioner) who has low income but high wealth (having saved some of their previous income), may answer that they have an adequate income; whereas a 35 year old forming a household may have much higher income but may perceive this to be inadequate. As Deaton (2010) suggests, to judge material well-being it could be most effective to simply ask people to judge their own circumstances rather than compare objective income metrics. These two points favor the use of the full ELSI rather than the simpler but less complete objective ELSI.

However the presence of a question on income adequacy may crowd out the impact of income from our regressions when the full ELSI is used. Furthermore, inherently optimistic (pessimistic) respondents may tend to answer positively (negatively) across a range of subjective questions (Dolan *et al.,* 2008) corresponding to both material standard of living and SWB. This concern indicates one disadvantage of including the responses for the self-assessments and even for the responses for goods where the individual has indicated that lack of ownership is due to choice. For the latter, however, there may be an offsetting effect: a more pessimistic person may respond both negatively for the self-assessments and to respond that they cannot afford an item whereas an optimistic person may respond positively to the self-assessments and state that ownership is due to choice. While there is some degree of subjectivity surrounding the questions within Objective ELSI, it is reasonable to consider the questions within this component as being

closer to an objective assessment of material living standards than are the explicit self-assessments.

To test the permanent income hypothesis more directly, we deconstruct ELSI in Section 6.3 and separately compare its two constituent parts (Objective ELSI and Subjective ELSI) alongside income. To calculate Objective ELSI, we employ a comparable methodology as for the full ELSI. Specifically, once the raw score is totaled, we control for outliers by setting raw scores that are less than seven equal to seven and then subtracting seven from all scores to remove outliers[22]. A strong, linear relationship exists between ELSI and Objective ELSI with a correlation coefficient of 0.96 between the two variables, demonstrating that the directly measured consumption components explain most of the variation in the broader ELSI measure.

4.5. *Descriptive Statistics*

Table A4 presents descriptive statistics for our key variables: life satisfaction, Ln(Income) where income is equivalized using the Modified OECD scale, and (full) ELSI. We also present descriptive statistics for Objective ELSI and Subjective ELSI.

The first panel of Figure 1 provides a standard box-plot of ELSI against life satisfaction.[23] As life satisfaction increases, so too does each of the lower quartile, median and upper quartile of ELSI. In the second panel of Figure 1, a box-plot of LnIncome (the logarithm of equivalized household income) against life satisfaction shows also that each of the lower quartile, median and upper quartile of income increases as life satisfaction increases. These patterns accord with prior expectations about the relationship between life satisfaction and material well-being measured either by income or by consumption (ELSI).[24]

We note different distributions across the two box-plots. The distribution of ELSI narrows as life satisfaction increases, whereas the distribution of income tends to widen as life satisfaction increases. People with high life satisfaction are unlikely to have low levels of consumption (ELSI) whereas they may have low levels of income. These latter relationships are in accordance with the permanent income hypothesis in which utility is more closely related to consumption than it is to current income.

Consistent with these observations, Figure 2 demonstrates that people with low levels of consumption (ELSI) also tend to have low levels of current income. However there is a wide distribution of income for people with high consumption levels (at least up to an ELSI reading of 29 out of 31). Thus we observe that for people with low incomes there is a wide distribution of consumption outcomes.

[22]As 30 is ~70 percent of 41 we set our outlier threshold to 70 percent of the Full ELSI level

[23]The top and bottom of each box indicate the first and third quartiles (Q1 and Q3) respectively, while the line within the box presents the median. The 'whiskers' extending from each box indicate the upper and lower adjacent values, which are the most extreme values within Q3+1.5(Q3-Q1) and Q1-1.5*(Q3-Q1), respectively); dots beyond the whiskers indicate outliers.

[24]We observe also from these box-plots that life satisfaction can vary considerably for people with high levels of material well-being measured either by consumption (ELSI) or income.

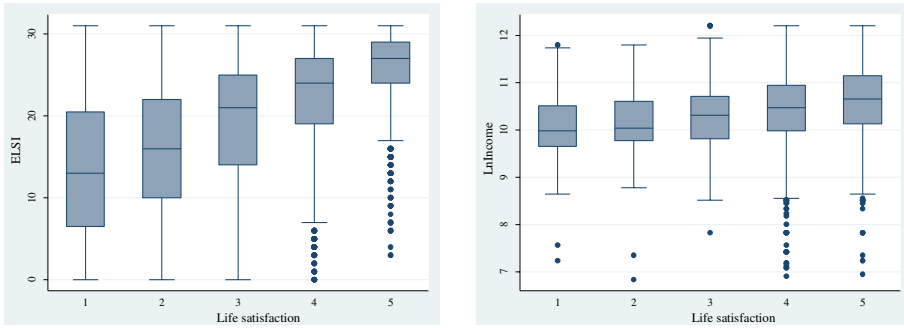

Figure 1. Life satisfaction, ELSI and log of equivalized household income [Colour figure can be viewed at wileyonlinelibrary.com]

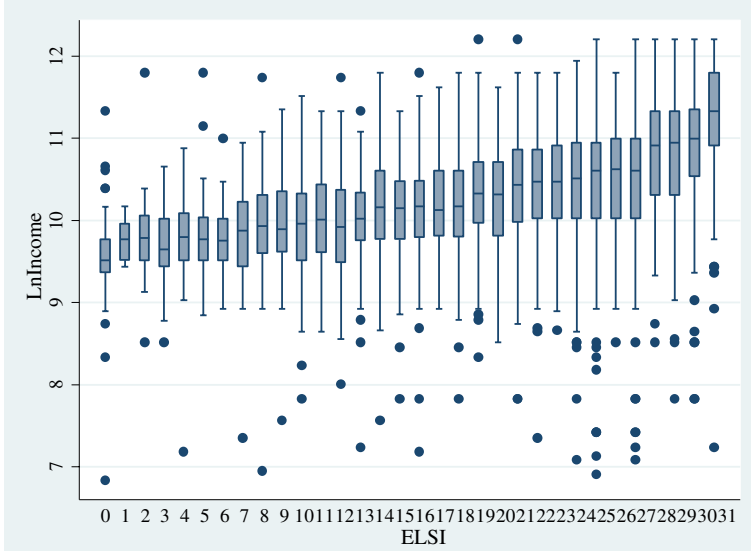

Figure 2. ELSI and log of equivalized household income [Colour figure can be viewed at wileyonlinelibrary.com]

5. Core Results

5.1. *Relationship of control variables to life satisfaction*

Carver and Grimes (2016) present the estimates for a number of well documented correlates of life satisfaction from estimation of equation (2) using OLS. The results are consistent with those in comparable studies. For instance, we find the typical U-shaped relationship between age and life satisfaction. With respect to labor market variables, we replicate the well documented result that being unemployed is negatively correlated with life satisfaction. In relation to self-rated health status, we find that higher levels of self-assessed health correlate with higher levels of life satisfaction. For education, we find a positive correlation between life satisfaction and level of educational attainment when no other

variables are included in the regression, but once other determinants of life satisfaction are controlled for, this effect largely disappears. Again, this is as found in many other studies (e.g. Boarini. *et al.,* 2012).

Other results for our covariates include that having children is correlated with higher levels of life satisfaction, while single people have lower levels of life satisfaction than those in a couple relationship. People who identify as Māori or of Pacific Island heritage are on average less happy than European (Pākehā) New Zealanders. However, once other factors are controlled for, this difference is no longer significant. By contrast, once other factors are controlled for, we find that women are on average happier than men. Being the victim of crime, having no support in a crisis, and smoking are all negatively correlated with life satisfaction. The fact that these results are consistent with those documented by other studies gives confidence in the reliability of our more novel findings.

One additional result is worth highlighting. Using the measure of regional deprivation ("NZDep,") we find that once all factors are controlled for, living in a poorer community is correlated with higher levels of life satisfaction. This result is consistent with the common finding that an individual's income *relative to their neighbors* is positively correlated with life satisfaction (Easterlin, 1995).[25] Thus both absolute and relative material well-being are seen to contribute to SWB.

5.2. *Central Findings*

In the first block of Table 1 we exclude the income term, and create equation (2) by incrementally adding more control variables in each column. We find that the coefficient on ELSI (β_3) is always positive and significant at the one percent level. In the equation that includes only exogenous controls (i.e. the second column, labelled D) the coefficient implies that a one standard deviation increase in ELSI is associated with a 0.38 point increase in life satisfaction (equivalent to 45 percent of a standard deviation of SWB). Thus (in the absence of income) we conclude that ELSI is positively (and materially) correlated with life satisfaction.

In the second block, we exclude the ELSI term, and again create equation (2) by incrementally adding control variables in each column of the table. The coefficient on income (β_2) is always positive and significant at the one percent level. Referring again to the column D equation, the coefficient implies that a one standard deviation increase in log-income is associated with a 0.18 point increase in life satisfaction (equivalent to 22 percent of a standard deviation of SWB). Thus (in the absence of ELSI, and in keeping with the literature) we conclude that household income is positively correlated with life satisfaction. We note that in every case, the regressions with only ELSI included outperform those with only income included.[26]

The third block follows the same procedure as above, with both ELSI and the natural log of equivalized household income included in the regression. The

[25]Festinger's 'social comparison theory' (1954), indicates that common reference points are those who live nearby (Diener *et al.,* 1993).

[26]i.e. a one standard deviation increase in ELSI has a greater effect on SWB than does a one standard deviation increase in income, while the adjusted R^2 of the ELSI equation is higher and the standard error of the regression is lower than for the income equation. In addition, both the Schwarz and Akaike information criteria (not listed in the table) are lower (superior) for the ELSI equation.

TABLE 1
Core Results

Variable	Coefficient	NC	D	D, X	D, X, Z
ELSI (C)	β_3	0.0577***	0.0598***	0.0558***	0.0388***
		(0.0016)	(0.0017)	(0.0018)	(0.0019)
Adj-R^2		0.1900	0.1986	0.2188	0.2995
Std-error		0.7657	0.7616	0.7519	0.7121
Ln(y)	β_2	0.2265***	0.2655***	0.1588***	0.0984***
		(0.0144)	(0.0160)	(0.0180)	(0.0167)
Adj-R^2		0.0338	0.0609	0.1058	0.2512
Std-error		0.8362	0.8244	0.8045	0.7362
Ln(y)	β_2	0.0006	0.0052	-0.0214	-0.0146
		(0.0138)	(0.0154)	(0.0170)	(0.0165)
ELSI (C)	β_3	0.0577***	0.0596***	0.0565***	0.0393***
		(0.0017)	(0.0019)	(0.0019)	(0.0019)
Adj-R^2		0.1899	0.1985	0.2189	0.2995
Std-error		0.7657	0.7617	0.7519	0.7121

Column headings: NC denotes there are no control variables in the regression; D denotes exogenous controls are included; D, X denotes exogenous and observed controls are included; D, X, Z denotes exogenous, observed and reported controls are included.

Row headings: Adj-R^2 is Adjusted R^2; "Std-error" is standard error of the regression. N (no. of observations) = 8,048 in all regressions. Standard errors are White heteroskedasticity-consistent.

coefficient on ELSI (β_3) is always positive and significant at the one percent level. With the inclusion of ELSI, we do not reject the null hypothesis that the coefficient on income (β_3), is zero (even at the ten percent level). Thus, once ELSI is included as a measure of material well-being, household income tells us nothing extra about life satisfaction. This is the central result of this paper, and—as shown in subsequent robustness tests—is obtained regardless of which modelling methodology or split sample is employed.[27]

We caveat this result by noting that the finding is based on inclusion of the full ELSI and so depends both on the objective and subjective components within the index. In Section 6.3 we show that for some sub-samples, β_3 is significant at the ten percent (but not the five percent) level when income is included together with only the objective portion of ELSI in the regression. Objective ELSI, however, retains its dominance in explaining SWB even in these cases. Furthermore, not only is the income coefficient never significant at the five percent level, it is not significant at even the ten percent level for many lower income and/or more deprived sub-samples that are often the main focus for policy.

6. Sensitivity Analysis

We explore the sensitivity of our central result to various alterations in our assumptions and estimation methodology. In each case, the reported regression includes all control variables. First, we compare the full sample results across

[27]In one split sample (the middle two quartiles of income) we are able to accept the alternative hypothesis that $\beta_3 > 0$ at the 10 percent level, but not at the 5 percent level. This is the only instance in which we are able to do so. In all instances ELSI's coefficient, β_3, is greater than zero at the 1 percent significance level.

OLS, ordered logit (Ologit) and ordered probit (Oprobit) models. Next, we split our sample by age, income, ELSI, ethnicity and region-type. We test our central hypothesis on each split sample. We then test the impact of different functional forms for household income and use of different household income equivalization methods. In all cases we find that ELSI's coefficient (β_3), is positive and significant at the one percent level. Further, we are never able to accept the alternative hypothesis that the coefficient for household income (β_2), is greater than zero at the five percent significance level. Finally, we test the impact of deconstructing ELSI into its "objective" and "subjective" components and testing these separately.

6.1. *Comparing OLS, OLogit and OProbit models*

Table A5 in the Appendix reports results from estimating the full version of equation (2) using OLS, OLogit and OProbit estimation methods (hence the first column of Table A5 is identical to the final column of the last block of Table 1). We obtain qualitatively similar results for each model, with our central result from Section 5 holding. ELSI is always positive and significant at the one percent level and income is never positive and significant even at the ten percent level. This consistency is in accordance with the cited results of Luttmer and Ferrer-i-Carbonell and Frijters.

6.2. *Split Samples*

Age Segments

In Table A6, we present OLS results with our sample split into three age categories: Young (15-29), Middle Aged (30-59) and Old (60+).[28] Across all three categories our core result from Section 5 holds.

Income Quartiles

Table A7 presents results where we split the sample into three categories based on the equivalized household income of the respondent: "Bottom Quartile", "Middle Two Quartiles" and "Top Quartile." Our results for the bottom and top income quartiles again reflect the central result from Section 5. This is notable given the proposition that ELSI should be less effective at the top end of the income distribution (Perry, 2015).

One result to note is that for the middle two quartiles we are able to accept the alternative hypothesis that the coefficient on income (β_2), is greater than zero at the ten percent level. This suggests that the poor relationship between life satisfaction and income (conditional on the inclusion of ELSI) is most apparent at the income extremes. Nevertheless, income remains insignificant at the five percent level, while ELSI remains positive and significant at the one percent level throughout.

[28]In New Zealand, it is illegal for any employer to set a 'retirement age' so there is no obvious age to split the two older groups.

ELSI Quartiles

In Table A8, we split the sample into three categories based on the ELSI score: "Bottom Quartile", "Middle Two Quartiles" and "Top Quartile". Our results for all quartiles again reflect the central result from Section 5 with income being insignificant throughout (even at the ten percent level).[29]

Ethnicity

Table A9 splits the sample by ethnicity (Māori, Pākehā (European), Pacific, Asian[30]). Again, we find that ELSI is always positive and significant at the one percent level while the coefficient for income is never positive and significant.

Urban / Rural Split

Housing comprises only a small portion of the overall ELSI[31], yet it accounts for a significant level of household disposable income. Furthermore, this level varies greatly across the country. The ratio of house prices to income in Auckland is more than 50 percent above the national average and well over 100 percent higher than in some rural areas of New Zealand (Greenaway-McGrevy and Phillips, 2016). The importance of income relative to ELSI may therefore differ across region type.

In order to test whether this is the case, Table A10 splits the sample by urban status: "Auckland urban," "other urban" and "rural."[32] We again find that ELSI is always positive and significant at the one percent level whilst income is never significant at even the ten percent level. Thus our central result is unaffected by the differing housing market conditions corresponding to these regional splits.

Functional form of Household Income

We have followed the norm in the literature and used the natural logarithm of equivalized household income as our default functional form for income. This is to account for the well documented concave relationship between income and subjective well-being (Kahneman and Deaton, 2010). We have also tested different functional forms for household income using three alternatives considered in other studies to fine-tune the concavity of the relationship. The first alternative includes the natural log of household income and "household income squared" in the same equation (Ln(y) and y^2) as used by Helliwell (2003) and Layard *et al.,* (2008). The second alternative includes household income and household income squared in the same equation (y and y^2). The third alternative includes household income, household income squared and "household income cubed" in

[29]In each of the cases where we split the sample according to (income or ELSI) quartiles, the ELSI coefficient for the bottom quartile is greater than for the higher quartiles; however the 95 percent confidence intervals for these coefficients in each case overlap across the quartile groupings.

[30]These results exclude those who reported multiple ethnicities. The results still hold if these people are included in any of the ethnicity groups they identify with.

[31]ELSI only includes one question asking if respondents have enough room for visiting family to stay.

[32]Auckland, with population of 1.4 million in 2013, is New Zealand's largest city comprising almost one-third of the country's population.

the same equation (y, y^2 and y^3). None of the alternative income variables shows any significance ($P > 0.30$ in all cases) and the choice of functional form has no discernible change on our core result. Specifically, ELSI remains significant at the one percent level while Wald tests for the joint significance of the income variables all have $P < 0.25$.

Alternative Household Income Equivalisation Methods

We assess the impact of altering the method for equivalizing household income. Table A11 reports the results for the Modified-OECD approach and for the old OECD household income equivalization method ("Old"), the Square Root method ("Square Root"), and for the Per Person equivalization method ("Per Person"). Our core result is robust against these variations.

6.3. *ELSI Decomposition*

As described in Section 4, ELSI is a composite index comprising objective and subjective elements, which we refer to as "Objective ELSI" and "Subjective ELSI" respectively. We test our results for the separate components, by replacing the full version of ELSI ("Full ELSI") with each element in turn. Table A12 presents these results.

The coefficient on income (β_2) is positive and significant at the ten percent level when household income and Objective ELSI are included in the same regression with Subjective ELSI excluded.[33] This suggests that the objective elements of ELSI may not completely replace the role of income in predicting SWB. Nevertheless, inclusion of Objective ELSI roughly halves β_2 compared with when ELSI is omitted from the regression altogether, and the income variable remains insignificant at the five percent level. Furthermore, when we estimate this form of the equation across sub-samples, β_2 is generally insignificant. The full list of split samples where income is not significantly positive comprises: Māori, Pacific, bottom income quartile, top income quartile, Auckland urban, other urban, rural, people under 30, and people between 31 and 60. This point is crucial as many of these are the segments of society for which ELSI was primarily designed as a measure of material well-being (Perry, 2015). Thus for these groups, which social policy (e.g. targeted social assistance) is most aimed at, income remains irrelevant in explaining SWB once Objective ELSI is included, even when Subjective ELSI is excluded. Furthermore, when we split the sample by three region types (as in Section 6.2.5) we find that income is not significant for any region type while Objective ELSI is positive and significant at the one percent level for each of the three region types.

We observe that β_2 is significantly negative when subjective ELSI is included in the regression both by itself and together with Objective ELSI. This suggests that the subjective elements of ELSI are, in some way, over-compensating for the effects of income on SWB so that the income coefficient becomes negative to offset this effect. Both Objective ELSI and Subjective ELSI are positively and significantly

[33]This result also holds across different estimation techniques.

related to life satisfaction (at the one percent level) when included in the same equation, with or without income included.

7. Discussion and Conclusions

Our central finding is that a consumption-based measure of material well-being (ELSI) outperforms surveyed income in predicting an individual's life satisfaction. Over each of our samples and testing methods we find that ELSI is a more reliable and informative predictor of life satisfaction than is income. When both are included in the same regression, income is almost always insignificant, whilst ELSI is always significant. The full generality of this result is dependent on the inclusion of ELSI's self-rated elements. When stripped out, and income is compared with only the "objective" elements of ELSI, both are significant, albeit income is only significant at the ten percent level. Furthermore, for key segments of the population (e.g. Māori, people under 30, and those on the lowest incomes), income remains insignificant altogether when only objective ELSI is included. This point is crucial as these are the segments of society that ELSI was designed for (Perry, 2015) and for which most social policy is aimed.

Despite its consistency with the theoretical economics literature, our central finding is novel within the empirical literature.[34] The result does not, however, necessarily foreshadow the end to income's role in studies of well-being or in public policy designed to improve the well-being of individuals. One reason is that our surveyed measure of household income, even if unbiased, is (as discussed above) subject to a number of potential inaccuracies, and is a measure of gross rather than disposable income. Measurement error is likely to cause attenuation bias in the estimated effect of income on SWB. Where more reliable income data are available (e.g. from administrative data) that data may be a more reliable proxy for SWB. Thus the empirical relationship between SWB, consumption and income may vary with data quality. Furthermore, if a consumption-based measure (such as ELSI) were unavailable, then our results confirm that a relationship between surveyed income and subjective well-being does still exist.

If policymakers were interested in raising material well-being (e.g. as measured by ELSI), they would have to consider the means to enable these ends. In some circumstances, social assistance may be delivered through provision of services such as healthcare or publicly-assisted housing especially for low income groups. Such assistance would be reflected as a rise in ELSI but not as a rise in income. In other circumstances, the means will be through income of some form. Our results indicate that surveyed income measures may sometimes be poor proxies for assessing poverty or SWB. Better material well-being proxies that are more closely related to SWB outcomes, can be constructed and used. ELSI is one such tool; the EU-13 index, which uses survey data from EU Statistics on Income and Living Conditions (EU-SILC), is another (Guio *et al.*, 2017). A logical extension of our analysis is to compare the EU-13 index with income as a predictor of SWB within European countries. For instance the 2013 EU-SILC survey included a

[34]There are no papers that we are aware of that document or test each of these relationships.

question on overall life satisfaction (as well as satisfaction with specific aspects of life) that could be linked to each individual's EU-13 index of material deprivation and to their income. Another desirable extension is to obtain administrative data for disposable income alongside consumption data for the same individuals and test whether the preference for a consumption measure over an income measure is confirmed using that data.

Use of material well-being measures such as ELSI and EU-13 can be seen as unifying two parts of the material well-being literature. The first is Friedman's permanent income hypothesis which postulates that current consumption is determined by lifetime resources. The second is the philosophical approach (championed, *inter alia*, by Deaton) which postulates that people are the best judges of their own circumstances implying that weight should be placed on the veracity of their own self-assessments. We conclude that, as a guide for social policy interventions, a consumption-based indicator such as ELSI has considerable merit—and may well be preferred—to an income indicator when assessing need and designing policy.

Disclaimer

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to keep individual information secure in accordance with requirements of the Statistics Act 1975. The opinions presented are those of the authors and do not necessarily represent an official view of Statistics New Zealand.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

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