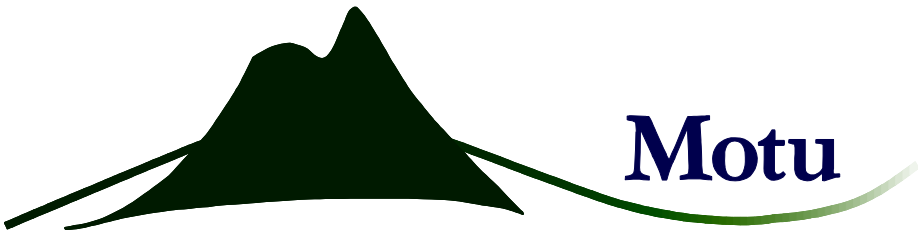

Relative Income and Subjective Wellbeing: Intra-national and Inter-national Comparisons by Settlement and Country Type

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Abstract
We extend the Easterlin Paradox (EP) literature in two key respects, testing whether inter-national as well as intra-national income comparisons matter for subjective wellbeing, and testing whether these effects differ by settlement-type as well as by country-type. We confirm the intra-national EP predictions (that subjective wellbeing is left unchanged by an equi-proportionate rise in all intra-country incomes) across four developed country settlement types ranging from rural areas to large cities. The EP result also holds for rural areas in transitional countries but not for larger settlement sizes in those countries. For all country-settlement types, we confirm the importance also of inter-national income comparisons in determining people's subjective wellbeing. Again, however, the effect is less prominent in larger transitional country cities. We also show that once we control for personal characteristics and income-related factors, we cannot reject the presence of a spatial equilibrium in life satisfaction. Our results indicate that each individual government that wishes to raise the life satisfaction of its residents still needs to boost those residents' incomes in order to raise their subjective wellbeing. However, at least amongst developed countries, this practice results in an international Prisoners Dilemma in which mean life satisfaction stays stable despite rising global incomes.

JEL codes
I31, H39, H24, R13

Keywords
Income comparison, wellbeing, Easterlin Paradox, spatial equilibrium

Contents

1. Introduction

The issue of inter-personal comparisons that may affect people's utility is a vexed one in economics. Historically, Veblen (1899) and Duesenberry (1949) highlighted the potential importance of inter-personal comparisons in affecting utility.[1] Nevertheless, the standard theories of consumption (e.g. Friedman, 1957) eschew the role of inter-personal comparisons in affecting welfare. Easterlin (1974) brought the issue of inter-personal comparisons back to the forefront, providing evidence[2] that an increase in a single citizen's incomes increases her welfare, while a proportionate increase in all citizens' incomes leaves all welfare levels unchanged. This 'Easterlin Paradox' implies that policies that strive to increase the incomes of all citizens by an equal proportion is up against a 'Prisoners Dilemma' in which people strive to increase their income but the end result is to leave all citizens no better off in welfare terms than before their quest.

Much of the work on the Easterlin Paradox, however, ignores two important aspects that we address. First, only rarely do studies address the issue of whether people may also form relativistic comparisons against citizens in other countries. The intra-national Prisoners Dilemma may exist, but if people also compare themselves with people in other countries then a country may raise its overall welfare by growing its incomes faster than other countries – though this may, of course, lead to an international-scale Prisoners Dilemma.

Second, only rarely do studies differentiate according to the size of settlement within a country. A separate branch of the wellbeing literature studies whether rural residents are happier than city residents, ceteris paribus. Some studies (but by no means all) find that rural residents in developed countries tend to be happier than their big city counterparts while the opposite may hold in transitional and developing countries. Thus it is important to incorporate the settlement type into studies of inter-personal comparisons and wellbeing.[3]

We bridge these two branches of the literature since the issues that they address may be inter-related. In particular, we test whether rural attitudes to relative incomes differ from urban attitudes, both within and across countries. For instance, it may be that rural residents are

[1] The role of habit-formation (i.e. habituation to past consumption levels) has also been highlighted by Duesenberry (1949) and by Fuhrer (2000).

[2] This evidence has since been contested. In the case of middle-income countries, observed higher incomes of others may increase an individual's utility if it signals the potential for further income gains by each individual. In our empirical work, we split our samples to test whether effects differ according to whether countries are developed or transitional (middle income); we do not consider low income countries.

[3] A related area of research examines spatial patterns in regional wellbeing outcomes (Okulicz-Kozaryn, 2011). We do not do so since, while our data indicates settlement size of respondents, it does not identify respondents' specific regions.

happier, on average, than their urban counterparts because they are less negatively affected by the (higher) incomes of others either within the country or across countries. Conversely, relative to residents in other areas, urban residents in mobile societies may become happier by observing others' higher incomes if it provides a signal that they too may aspire to higher incomes as a result of their opportunities (a phenomenon known as the 'tunnel effect'). If a rural-urban differentiation is observed, this implies that the importance of income comparisons may be socially motivated, whereas if no differentiation is observed, an implication is that the role of comparative incomes in affecting utility may be more hard-wired into the human brain.

Using European and World Values Survey data, we confirm that individuals' life satisfaction (subjective wellbeing) rises as their personal income rises and falls as the incomes of similar individuals (according to age, sex and education) within their own country rise. This occurs across all country- and settlement-types. The intra-national predictions of the Easterlin Paradox are confirmed for all developed country settlement-types plus transitional country rural areas, but not for non-rural settlement types in transitional countries.

When we extend our investigation to include inter-national income comparisons, we confirm the importance of inter-national income comparisons for individuals' subjective wellbeing across all country- and settlement-types. This extends the findings of Becchetti et al (2013) who found a similar result but just for developed countries and without testing for settlement-type. Our findings show that while inter-national income comparisons are important across all countries and settlement sizes, the effect is smaller for transitional country large cities (relative to other country-settlement-types), consistent with a type of tunnel effect.

Our raw data indicate that in developed countries, life satisfaction in large cities tends to be lower than in other settlement-types, while in transitional countries, life satisfaction in large cities tends to be higher than that in other settlement-types. However once we include a full set of controls plus related income effects, we find no differences in life satisfaction across settlement sizes in either country-type, consistent with the presence of spatial equilibrium.

This set of results takes both the Easterlin Paradox literature and the rural-urban life satisfaction literature in new directions, highlighting factors that need to be considered in evaluating how incomes affect life satisfaction at the levels of the individual, the settlement and the country. Section 2 provides a brief review of relevant literature and, based on this literature, outlines our testing methodology. In section 3 we detail our data and provide descriptive graphs for key variables. Section 4 provides the results of our tests, while section 5 discusses the

implications of our results for understanding the complex relationships between income and personal wellbeing across settlement and country types.

2. Literature and Methodology

It is now widely accepted that broad measures of wellbeing should be incorporated into policy-makers' objective functions when making policy choices (Stiglitz et al., 2009; Easterlin, 2010; Layard, 2011; Helliwell et al., 2013; Grimes et al, 2014). One such measure – that we use in this study as an indicator of subjective wellbeing – is life satisfaction. We briefly review the validity of life satisfaction measures as proxies for true wellbeing. We then outline key contributions regarding the Easterlin Paradox before reviewing studies that examine spatial differences in wellbeing across urban versus rural settings. The methodological approach that we outline flows from the questions raised in the relevant branches of the literature.

2.1. Life satisfaction and subjective wellbeing

The psychological literature has long used subjective wellbeing measures as valid indicators of human happiness (Diener et al., 1999; Di Tella & MacCulloch, 2006; Kahneman and Krueger, 2006; Clark et al., 2008; Dolan et al., 2008). Economists' increasing acceptance of subjective wellbeing as a valid outcome measure rests, in part, on the correlation between subjective wellbeing (including reported life satisfaction measures) and objective measures of wellbeing and utility. For instance, Grimes et al. (2014) take migration to be an objective revealed preference measure of wellbeing enhancement, and find that survey based life satisfaction indices have explanatory power over and above income in explaining net international migration. Oswald and Wu (2010) find strong and significant correlation between subjective life satisfaction and objective measures of wellbeing across US states.

There is also support for the validity of subjective wellbeing measures from a range of neuroscience studies (Ekman et al., 1990; Frey & Stutzer, 2002; Kahneman & Krueger, 2006; Layard, 2011). These studies link life satisfaction measures, inter alia, with activity in the left and right prefrontal cortex, psychological depression, suicide rates and smiling. Frey and Stutzer (2002) find a high correlation between an individual's self-reported life satisfaction and their life satisfaction as reported by family and friends, while Deaton (2008) finds a relationship between subjective wellbeing scores and health. Krueger and Schkade (2008) find serial correlation of life satisfaction of around 0.60 in surveys two weeks apart. They conclude that while less reliable over time than other common micro variables such as education and income, life satisfaction

measures are sufficiently informative to underpin research on subjective wellbeing. Accordingly, the majority of economists[4] using subjective wellbeing data treat it as a valid, but noisy, measure of true utility (Di Tella & MacCulloch, 2006; Layard et al., 2008), with life satisfaction of individual i at time t being a function of true utility u_{it} plus a random additive term, v_{it}:

$$LS_{it} = g(u_{it}) = u_{it} + v_{it} \quad (2.1)$$

Importantly, the use of noisy life satisfaction data as the dependent variable in a regression, as long as measurement errors are 'white noise', implies the loss of estimation precision but not the introduction of bias.

2.2. Easterlin Paradox

Easterlin (1974) found a paradox in the relationship between GDP, income and subjective wellbeing: (i) within countries, richer people are more satisfied with their lives than are poorer people; (ii) richer countries tend to be, on average, happier than poorer countries;[5] however, (iii) over time, subjective wellbeing at the national level does not rise with income. At its most extreme interpretation, the Easterlin Paradox implies that if each individual in society becomes richer by the same degree then no individual is any better off (in subjective wellbeing terms) than they were prior to their income increasing.

One possible explanation of the paradox is a process of adaptation to income over time whereby increased income increases aspirations commensurately so that income does not increase happiness in the long run (Duesenberry, 1949; Brickman and Campbell, 1971; Di Tella et al., 2010). A second explanation, also suggested by Duesenberry and highlighted by the 'Leyden School' (Van Praag & Kapteyn, 1973; Kapteyn et al., 1978), is a 'Relative Income Hypothesis' by which people derive utility from income in relation to other groups. Luttmer (2005), using a large US longitudinal panel, found that the average income of one's neighbours has large and significant negative effects on happiness that are opposite and equal to the positive effects of one's own income (i.e. the Easterlin Paradox).[6] He also found that those who socialise

[4] Though not all; see Glaeser et al (2014) for a view that life satisfaction is a component of true utility but is not synonymous with it.

[5] While a later study by Easterlin et al. (2010) contends otherwise, there is strong evidence that richer countries are on average happier than poorer countries (Diener et al., 1995; Stevenson and Wolfers, 2008; Deaton, 2008; Diener, Tay, & Oishi, 2013).

[6] Luttmer uses an OLS regression in his main approach; when using ordered probit as a robustness check, the signs and significance of his results do not change. Ferrer-i-Carbonell & Frijters (2004) also find that OLS and ordered logit produce similar results.

more frequently with people in the same neighbourhood are more adversely affected by average neighbourhood income, whereas those who socialise with people in other neighbourhoods are less adversely affected.[7]

The importance of choosing an appropriate reference group (in Luttmer's case, incomes in the same local area) is highlighted by a range of studies.[8] The most common method to capture the appropriate reference income is to calculate the average income for people with a given set of characteristics shared by the individual and use this as relative income (y^*) in the utility function:

$$U = u(y, y^*, \boldsymbol{x}) \qquad (2.2)$$

where y is own income, y^* is the reference group income, and **x** is other (non-pecuniary) determinants of utility (for example age, gender, marital status).

Depending on the nature of the environment, reference groups may not always impose a negative effect on subjective wellbeing. Senik (2008) found that in stagnant and immobile countries ('old Europe'), higher relative income has negative effects whereas in countries with higher degrees of mobility (post-transition European countries plus the United States), reference income signals potential future income gains and so is viewed positively. Caporale et al. (2009) find similar results although a re-examination of their findings by Drichoutis et al (2010) using the same data source reveals that reference incomes in 'old' and in 'new' Europe mostly have an insignificant effect on individuals' subjective wellbeing (the exception is in Scandinavian countries where higher reference incomes reduce subjective wellbeing).

In contrast to the literature supporting the Easterlin Paradox, Stevenson & Wolfers (2008; 2013) find that income is correlated with life satisfaction at all income levels, and find evidence that the gains are larger at higher income levels.[9] Furthermore, they find that similar coefficients are shared by the relationship between income and life satisfaction at the cross country and at the domestic level, and find that changes in economic growth are (positively) associated with changes in subjective wellbeing.[10]

[7] Similarly, Bruni & Stanca (2006) find that the effect of income on life satisfaction decreases for heavy compared to occasional television watchers. Similar effects are found by Stutzer (2004) and Frey et al (2007).

[8] Festinger (1954); Diener et al. (1993); Clark & Oswald (1996); Falk & Ichino (2006); Clark et al. (2008); Jones & Sloane (2009); Sloan & Williams (2000); Clark & Senik (2010); McBride (2010); Helliwell & Huang (2010); Frey et al. (2014).

[9] For a similar result, see Deaton (2008).

[10] The Stevenson and Wolfers results are, however, contested with critics arguing that they do not adequately control for personal characteristics or country attributes (Helliwell et al, 2013; Layard et al, 2009; Inglehart et al, 2008).

The Stevenson and Wolfers results, if taken at face value, suggest another hypothesis: that relative income effects might operate at both the national and the international level. The extension of reference income to other nations was suggested by Clark et al (2008) who postulated that individual utility may be a function of (i) own income, (ii) own income relative to comparable intra-country income, and (iii) average own country income relative to average income over a whole set of countries.[11] However, the literature on the importance of inter-national relative income is sparse despite evidence that macroeconomic variables have real effects on individuals' subjective wellbeing (Di Tella et al, 2003). One study that explicitly tests the hypothesis that other countries' national income can have reference group effects is Becchetti et al. (2013). They find that people in developed European countries compare their material standard of living with living standards in other countries; the closer the country, the greater is the (negative) effects on own life satisfaction of an increase in other countries' incomes. They also show that intensity of media exposure increases the 'comparison' factor, essentially shortening the distance between countries. Given the results of Senik (2008) and others, a natural extension of Becchetti et al is to test whether inter-country comparison effects are similar across established developed countries versus transitional and developing economies.

2.3. Rural versus urban life satisfaction

A growing body of work investigates how life satisfaction varies between rural and urban areas. Cantril (1965) established that life satisfaction was approximately equal in rural and urban areas of developed countries; however, in developing countries, life satisfaction in urban areas exceeded that in a country's rural areas. Veenhoven (1994) found similar spatial patterns. Berry and Okulicz-Kozaryn (2009) examined the issue further, hypothesising that as countries begin to urbanise, city living is favoured over rural living but once city living becomes more ubiquitous, congestion externalities mount that reduce life satisfaction in cities. They contrasted rural locations against large cities finding that rural and urban life satisfaction was approximately equal in a group of ('Latin') developed countries whereas Anglo-Saxon developed countries showed higher rural than urban life satisfaction. Individuals in developing Asian cities experienced higher life satisfaction than their rural counterparts but in other developing countries, there was no significant difference between rural and urban life satisfaction.

In examining one Anglo-Saxon country (New Zealand), Morrison (2011) found results consistent with those of Berry and Okulicz-Kozaryn. After controlling for individual

[11] See especially, Clark et al (2008) equation (3), p.102.

characteristics, Morrison found that life satisfaction in Auckland City (New Zealand's largest city) was lower than in a range of smaller cities, despite the material quality of life being at least as high for those in Auckland. However within Australia (another Anglo-Saxon country), Kettlewell (2010) found a contrary result. He estimated that while male 'rural-to-urban-movers' experienced no change in their life satisfaction (over a four year post-migration period), female rural-to-urban-movers experienced a (statistically significant) increase in life satisfaction in years 3 and 4 following their move.

Like Cantril and Veenhoven, Easterlin et al (2011), using Gallup Poll data, found substantially greater life satisfaction in urban relative to rural areas within developing countries but found that these differences disappear in developed countries. A key contribution of their study is to show that the rural-urban life satisfaction divide in developing countries can largely be explained by differing occupation structures, incomes and education levels.[12] In contrast, Drichoutis et al (2010), using data for non-Anglo-Saxon European countries, found that both happiness and life satisfaction is higher in rural than in urban locations.[13]

Two lacunae are apparent in this range of spatial studies. First, as suggested by Morrison (2014), internal migration should play a spatial arbitrage role in evening out life satisfaction differences across settlement types within countries. The reasons why this may not occur are still at issue.[14] Second, given the large literature on interpersonal comparisons, life satisfaction differences between rural and urban areas may reflect differing emphases placed on income (or other) relativities in different areas. For instance, one may hypothesise that if rural areas are more stagnant or immobile than urban areas, then rural residents may be more prone to making interpersonal comparisons than their urban counterparts who may be more likely to have positive tunnel effects. This may be the case both within and across countries. We bring the inter-personal relativity effects (at both intra-national and inter-national levels) face-to-face with the rural-urban wellbeing literature to test whether the strength of inter-personal comparisons differs across spatial types. Our tests also extend previous literature by distinguishing between effects in developed countries versus those in transitional economies.

[12] Easterlin et al provide evidence that selectivity of rural out-migration based on education or other personal characteristics does not contribute materially to observed urban rural life satisfaction differences.
[13] Drichoutis et al split present split-sample results for reference income effects according to whether countries are in Eastern Europe, Southern Europe, Scandinavia or Central Europe, but they do not present the rural versus urban results for these country splits.
[14] Glaeser et al (2014) explain the lack of complete convergence by hypothesising that utility may be equalised across space, but they treat life satisfaction as only one argument in the utility function.

2.4. Methodology

We take the generic utility function in (2.2) as the starting point for our investigation but extend it to incorporate a number of refinements suggested by the surveyed literatures. Specifically, we relate life satisfaction of individual i in settlement-type s (discussed further below) within country j at year t (LS_{isjt}) to their own real (CPI-adjusted) income ($OwnIncome_{isjt}$), the mean income of a reference group within their own country in the same year ($RefIncome_{isjt}$), and the per capita (PPP-adjusted) Gross National Disposable Income (GNDI) of their country relative to a mean of comparator country GNDIs ($RelGNDI_{jt}$)[15], plus a vector of personal characteristics ($\boldsymbol{X}_{isjt}$),[16] country fixed effects (β_j)[17] and wave fixed effects (τ_t).[18] Each of $OwnIncome_{isjt}$, $RefIncome_{isjt}$ and $RelGNDI_{jt}$ is expressed in natural logarithms.[19] We test if the coefficients on $OwnIncome_{isjt}$ and $RefIncome_{isjt}$ are of equal and opposite signs, in which case the Easterlin Paradox holds within countries.[20] We also test if the coefficient on $RelGNDI_{jt}$ is positive; if it is positive, an increase in a country's GNDI relative to those of its international comparators raises the life satisfaction of its residents.

Rather than treating the parameters as constant across country-type and across settlement-type, we differentiate our estimates based on whether the individual resides within (i) a founding OECD member country versus a transitional economy (indexed by k=1, 2 respectively); and (ii) whether the individual lives in one of four types of settlement: rural, town, small city or large city (indexed by s=1, 2, 3, 4 respectively). Thus we estimate 8 parameters (2 country-types by 4 settlement-types) for each of our main variables of interest. This approach enables us to test hypotheses not only about the Easterlin Paradox and international comparisons, but also whether responses of life satisfaction to the income variables are identical across country- and settlement-type. We include settlement size intercept dummies (δ_{sk}) for each country type (excluding large cities (s=4) which is set as the base category in each case). These

[15] The definitions of reference income and of comparator country GNDI are discussed further in section 3.

[16] We control for a quartic polynomial in age (Blanchflower & Oswald, 2008; Clark, Oswald, & Warr, 1996), marital status (married, divorced, widowed, cohabiting, separated), employment status (unemployed, full-time worker, part-time worker, retired, house-spouse, self-employed, student), gender, and gender interacted with the other controls. Education controls (relating to eight different education levels) are included in all but one regression (Flouri, 2004; Dolan et al, 2008; Graham, 2011; Morrison, 2011).

[17] Country fixed effects account for the effect of (unchanging) country institutions (Veenhoven, 2009) and for any systematic tendency to report higher or lower life satisfaction based on country of residence.

[18] Wave fixed effects refer to the specific wave of the World Values Survey. We cannot include Wave*Country interacted fixed effects as they would be collinear with the *RelGNDI* term.

[19] We follow the norm of using log income implying the same unit life satisfaction effect of a given percentage change at all levels of income (Stevenson & Wolfers, 2008; Easterlin et al, 2010; Diener et al, 2013).

[20] If the coefficient on $RefIncome_{isjt}$ is negative but smaller in absolute value than the coefficient on $OwnIncome_{isjt}$ then reference incomes still matter (negatively) for the individual but an equi-proportionate income increase for all individuals raises life satisfaction, unlike the pure Easterlin Paradox case.

dummy variables enable us to test whether any settlement type differences in life satisfaction (across each country type) remain once all other factors in the equation are accounted for.[21]

Our base equation is therefore of the form:

$$
\begin{aligned}
LS_{isjt} &= \boldsymbol{\alpha X}_{isjt} + \beta_j + \tau_t \\
&+ \sum_{s\neq 4}\sum_{k} \delta_{sk} + \sum_{s}\sum_{k} \varepsilon_{sk} OwnIncome_{isjt} \\
&+ \sum_{s}\sum_{k} \theta_{sk} RefIncome_{isjt} + \sum_{s}\sum_{k} \gamma_{sk} RelGNDI_{jt} + \mu_{isjt}
\end{aligned}
\tag{2.3}
$$

where μ_{isjt} is the residual term that, inter alia, includes the v_{it} term from equation (2.1); all other terms are defined above (recalling that each of *OwnIncome*, *RefIncome* and *RelGNDI* is expressed in natural logarithms).

Although life satisfaction (the dependent variable) is measured on an ordinal (1 to 10) scale, equation (2.3) is estimated using ordinary least squares (OLS) given the findings of prior studies such as Ferrer-i-Carbonell & Frijters (2004) and Luttmer (2005) that OLS produces similar results in terms of signs and significance to ordered logit (and ordered probit). This implies that we treat the life satisfaction variable as if it were a cardinal measure. We test the robustness of this assumption by estimating the equation also by ordered logit, finding robust results across estimation method. We also subject (2.3) to a range of other robustness tests, discussed in section 4. The OLS estimation approach may result in heteroskedastic errors, while the inclusion of *RelGNDI* in the regression introduces observations that are common to all respondents within a country. In addition, error terms within a country may be correlated given cultural similarities within countries. All our estimates therefore use robust and country clustered standard errors.

[21] We could potentially split the sample along other dimensions such as allowing for age-specific or gender-specific coefficients. Given that we already have eight coefficients for each variable of interest, we choose not to aggregate further but these could be avenues for extensions to the analysis.

3. Data

We utilise data collected in all four waves of the European Values Survey (EVS), supplemented with compatible World Values Survey (WVS) data.[22] We use the EVS Longitudinal Data File which contains harmonised variables including data for subjective well-being and reported income for countries; we use data surveyed from 1990 to 2009. Individual respondents are chosen by random or multi-stage representative sampling and surveys are carried out by researchers in respective countries. Uniform 'master' structured questionnaires are used, enabling generalizations and comparisons between country-wave surveys (Halman, 2001). The continuity and consistency in questioning over variables such as Life Satisfaction, age, marital status, employment status and gender makes this an appropriate data source for our research.

Data for life satisfaction comes from responses to the question: "*All things considered, how satisfied are you with your life as a whole these days?*" Respondents are asked to respond on a 1 – 10 integer scale with 1 denoted "dissatisfied" and 10 "satisfied".

Household income data are less consistent across countries and over waves than for some other data.[23] We drop all country-wave survey responses in which interpretation of responses is unclear or where necessary information is not available. In all other cases, we code country and wave specific income observations as the midpoint of the corresponding income category as stated in the EVS codebook.[24] We have coded the top income interval (that has no upper bound) in two separate ways. First, we code the income in this band as the lower bound (thereby truncating the incomes of all members in this band). Second, reflecting an approach offered by Donnelly & Pol-Eleches (2012), we code the income in this band as the lower bound plus half the band-width of the second highest band. We have run our equations using both coding approaches and find very little difference in results, so present only those using our (preferred) second coding method.

[22] The EVS data are publicly available from http://www.europeanvaluesstudy.eu; see EVS (2011). Wave 1 is not considered due to a lack of data.
[23] For some country-wave observations (such as Malta in 1999) income is not reported coherently and no information is available to interpret coding. In other cases (Great Britain, 1999) income is coded on a scale of 1 to 10 with no indication as to the corresponding income categories.
[24] In some cases, for example Greece 1999, the original questionnaire was studied to ensure correct coding.

We source country CPI indices, based on average consumer prices for the year, from the International Monetary Fund World Economic Outlook Database and real GNDI per capita (at purchasing power parity) from the AMECO (European Commission) database.

Our country sample is chosen to include established developed countries, for which our definition is that the country had to be a founder member of the OECD.[25] Given the literature on the wellbeing versus income relationship in transitional countries, we also include a group of transitional middle-income countries, six of which have joined the OECD since 1994; the remaining five are middle-income European countries. We drop any country that has only one wave of data to enable inclusion of country fixed effects. This process results in the inclusion of 27 countries across 4 waves with 68 cross-sections that include 78,058 individual observations. Of the 27 countries, 16 are OECD founder members and 11 are classed as transitional (other) countries.

[25] Turkey is included in this group although it has some characteristics of a transitional economy. However, to avoid selection bias, we retain it in our founder OECD sample (as we do also with Greece).

Table 3.1: Countries and Waves

		Wave* observations				
		2	3	4	5	Total
	OECD founding countries					
1	Austria	1,414	1,214	0	1,246	3,874
2	Belgium	1,705	1,532	0	1,354	4,591
3	Canada	1,461	1,714	1,735	0	4,910
4	Denmark	0	902	0	1,038	1,940
5	France	0	1,292	882	1,359	3,533
6	Germany	0	1,553	0	1,796	3,349
7	Great Britain	1,101	0	803	691	2,595
8	Greece	0	910	0	1,276	2,186
9	Ireland	893	802	0	389	2,084
10	Italy	1,422	1,513	672	956	4,563
11	Netherlands	779	910	0	1,307	2,996
12	Portugal	1,124	676	0	807	2,607
13	Spain	2,262	805	0	946	4,013
14	Sweden	0	654	952	1,098	2,704
15	Turkey	0	1,185	0	1,440	2,625
16	United States	1,644	1,127	1,180	0	3,951
	Sub-Total	*13,805*	*16,789*	*6,224*	*15,703*	*52,521*
	Other (transitional) countries					
17	Bulgaria	0	942	0	1,327	2,269
18	Croatia	0	971	0	1,293	2,264
19	Czech Rep.	0	1,719	0	1,414	3,133
20	Estonia	0	884	0	1,326	2,210
21	Latvia	0	954	0	1,295	2,249
22	Lithuania	0	848	0	1,267	2,115
23	Macedonia	0	1,022	0	1,439	2,461
24	Malta	0	715	0	420	1,135
25	Mexico	1,443	999	1,418	0	3,860
26	Slovakia	0	1,232	0	1,143	2,375
27	Slovenia	0	648	0	818	1,466
	Sub-Total	*1,443*	*10,934*	*1,418*	*11,742*	*25,537*
	Total	**15,248**	**27,723**	**7,642**	**27,445**	**78,058**

* Wave 2 dates: 1990 – 1991
Wave 3 dates: 1998 – 2003
Wave 4 dates: 2004 – 2007
Wave 5 dates: 2008 – 2009

Table 3.1 lists the countries, waves and number of observations in each country-wave. In wave 3, 26 of the 27 countries have valid observations while 24 countries have valid responses for wave 5. Wave 2 includes 10 OECD founders but only one transitional country. This wave is also problematic in its omission of education data for individuals. For this reason wave 2 is included in only one of our regressions which we use to test the robustness of our main results.[26]

Figure 3.1 graphs mean life satisfaction by country for wave 3 (which includes data for all our countries other than Great Britain) plus mean life satisfaction for Great Britain averaged over waves 2 and 4. It shows that life satisfaction in most transitional countries is below that of most founder OECD countries with the exception of three outliers: high life satisfaction for both Malta and Mexico, and low life satisfaction for Turkey (and, to a lesser extent, Greece).[27] Consistent with this observation, Figure 3.2 shows a strong relationship between (wave 3) life satisfaction and the logarithm of GNDI per capita (at PPP).

We construct $OwnIncome_{isjt}$ as the log of (CPI-adjusted) income of individual respondent *i*. $RefIncome_{isjt}$ is the log of the mean income of similar individuals within a country for each wave, where a similar individual is defined as one of the same gender, age (divided into age bands: <25, 26-35, 36-45, 46-55, 56-65, 65+) and employment status.

The relative national income variable ($RelGNDI_{jt}$) is defined as the log GNDI per capita (at PPP) of i's country (country *j*) for a given year minus the log of the EU15 mean GNDI for that year. We use the exact year of the survey in country *j* rather than the wave average since the latter incorporates different years for different cross sections. This is important both to include the appropriate GNDI for each individual and to ensure year to year fluctuations in the comparator country GNDI data within waves so allowing for the inclusion of wave dummies that are not perfectly collinear with comparator country GNDI. As well as using EU15 GNDI as our international comparator, we test robustness by variously using US GNDI and the mean of EU15 and US GNDI as the international comparator (finding very similar results).[28]

[26] Education is significant in equations that include only waves 3-5, especially in relation to life satisfaction in rural areas and in small cities both of which indicate a statistically significant positive gradient of life satisfaction with respect to education level. Thus omission of education variables when using settlement size data will result in omitted variable bias, underpinning our decision to omit wave 2 in our preferred estimates.

[27] In our estimates, country fixed effects account for systematically high or low life satisfaction in particular countries.

[28] Another international comparator option would be to include spatially-weighted GNDI. However this could yield odd results such as implying that US citizens compare their living standards strongly to those in Mexico which is unlikely to be the case. In addition, it is unclear which country to treat as contiguous in the case of island nations such as Malta and Great Britain.

Figures 3.3a and 3.3b graph *RelGNDI* for each of the country sub-sets for the period 1990-2009 (with the starting point for each series normalised to zero). We see considerable cross-country variation in RelGNDI for both country sub-sets. Thus if relative national income movements affect residents' life satisfaction, we should have sufficient variability to detect such an effect.

Figure 3.1 Mean Life Satisfaction by Country (Wave 3)

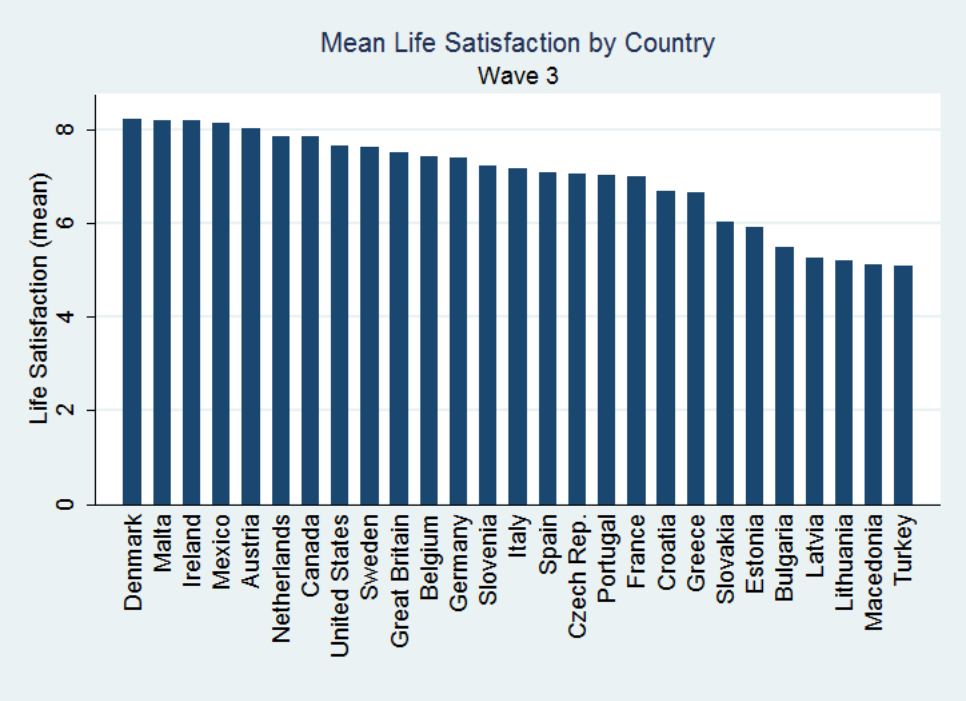


Figure 3.2 Life Satisfaction and log(GNDI per capita at PPP) (Wave 3)

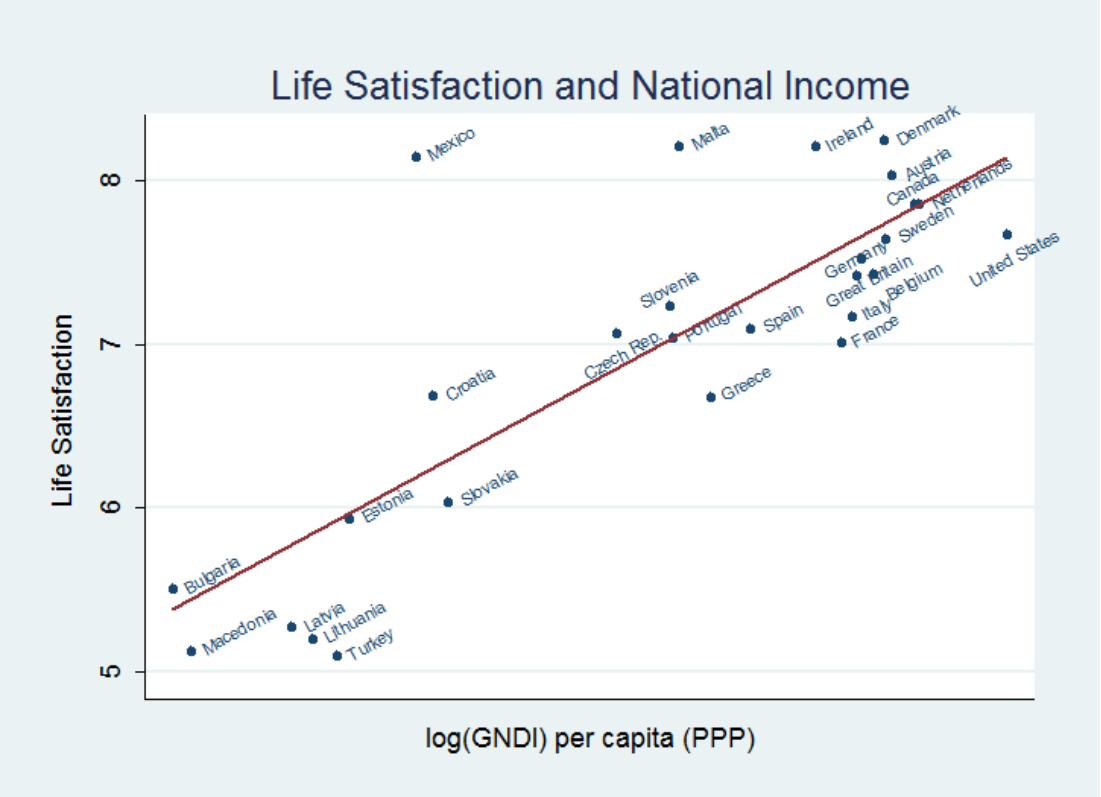


Figure 3.3a *RelGNDI* for OECD Founder Countries

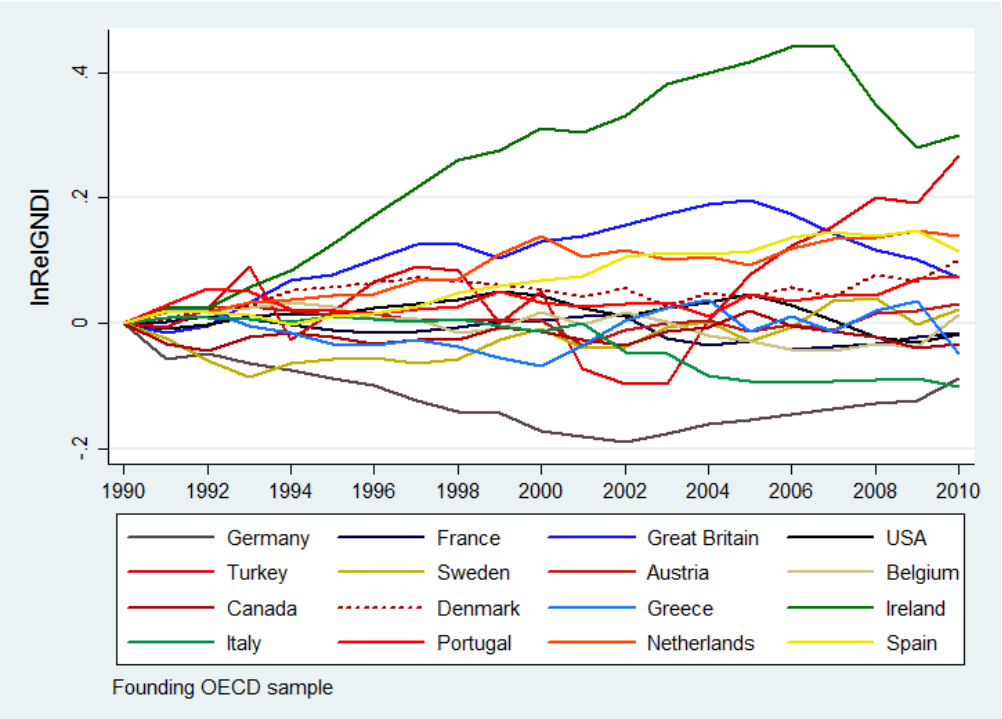
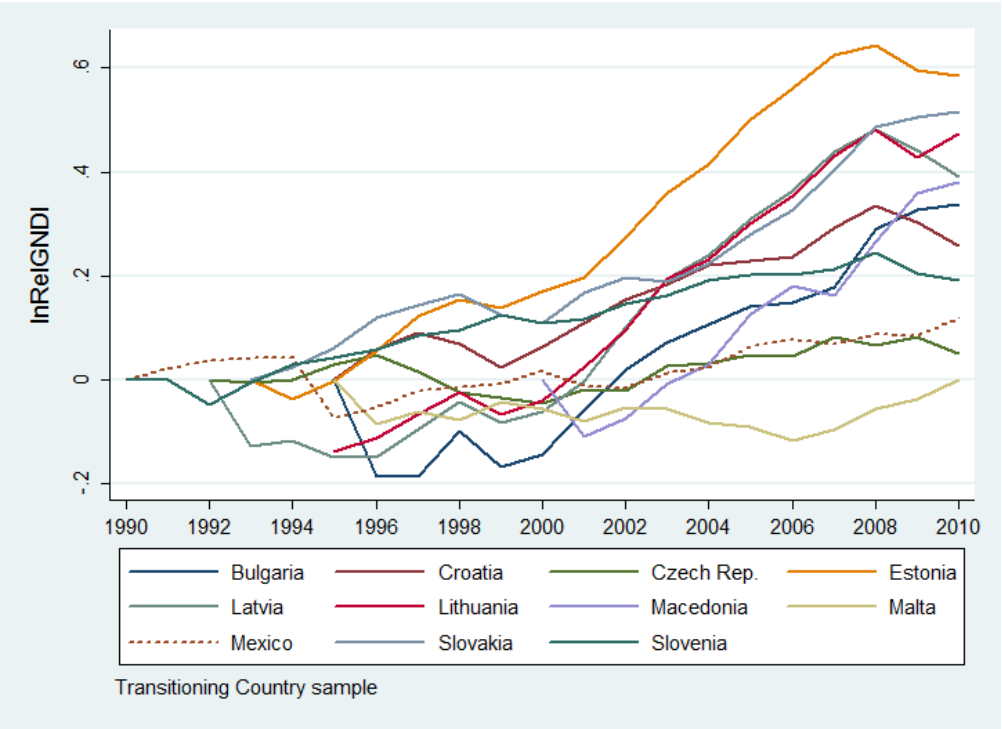


Figure 3.3b *RelGNDI* for Transitional Countries



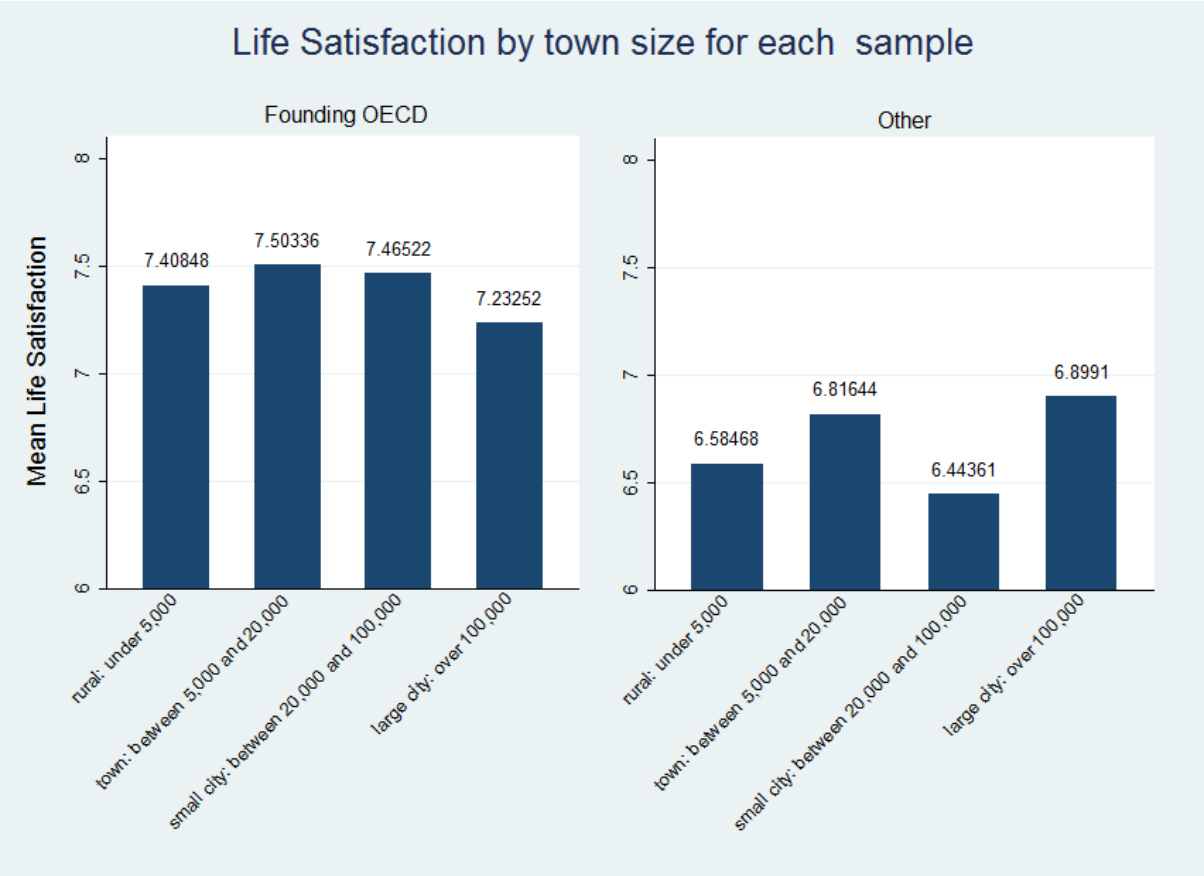
The EVS/WVS offers 8 categories for settlement size.[29] We undertook a series of pairwise comparison tests of life satisfaction in each settlement type (without controls) and could not reject a grouping that collapses each successive pair into a single category. Thus the four settlement size groupings that we use in this study are defined as:

1. **Rural** : population under 5,000 people
2. **Town**: population between 5,000 and 20,000 people
3. **Small City**: population between 20,000 and 100,000 people
4. **Large City**: population over 100,000 people.

Figure 3.4 graphs mean life satisfaction by town size for each of the founder OECD sample and the transitional (other) country sample. The graphs cover all four waves for all eligible samples. The raw data shown in Figure 3.4 indicate that mean life satisfaction in OECD founder large cities is lower than in all other settlement-types, while life satisfaction in transitional country large cities is higher than in all other settlement-types. We return to the issue of whether these findings are statistically significant, and robust, once we control for a range of variables in section 4.

[29] I.e.: <2,000; 2,000-5,000; 5,000-10,000; 10,000-20,000; 20,000-50,000; 50,000-100,000; 100,000-500,000; and >500,000.

Figure 3.4 Mean Life Satisfaction by Settlement-Type



4. Results

Our prime focus is to estimate equation (2.3) in order to test our hypotheses about intra-national and inter-national comparative income effects across country- and settlement-type. We begin, however, with a simpler set of equations (presented in Table 4.1) that ignore the settlement size dimension so providing a baseline for the subsequent results that differentiate by settlement-type. All equations are estimated by OLS unless otherwise specified. We do not use probability weights in any of the equations since these weights relate only to representativeness of samples within a country rather than across countries.[30]

[30] Use of probability weights would imply giving US respondents 750 times greater weight than respondents in Malta given the populations of the two countries; we do not consider this is a sensible approach. As a preliminary exercise to test whether use of within country probability weights is likely to make much difference to the results, we constructed mean life satisfaction scores for the 8 raw town size categories for OECD members with and without weights; the patterns are similar with a correlation coefficient between the two of 0.81.

Table 4.1: Life satisfaction equations by country-type (excluding settlement-type)

Dependent variable: *Life satisfaction*	[1]	[2]	[3]
OwnIncome	0.126**	0.356***	0.349***
	(0.0477)	(0.0456)	(0.0433)
OwnIncome-Trans	0.113	0.0868	0.0882
	(0.0829)	(0.0839)	(0.0833)
RefIncome		-0.270***	-0.354***
		(0.0435)	(0.0496)
RefIncome-Trans		0.0043	0.0724
		(0.0949)	(0.0925)
RelGNDI			4.161***
			(1.184)
RelGNDI-Trans			-2.131*
			(1.157)
Constant		9.257***	9.844***
		(0.884)	(0.922)
Observations	62,383	62,383	62,383
No. of Countries	27	27	27
Waves included	3 - 5	3 - 5	3 - 5
Wave fixed effects	Y	Y	Y
Country fixed effects	Y	Y	Y
Education controls	Y	Y	Y
Other personal controls	Y	Y	Y
Estimation method	OLS	OLS	OLS
R^2	0.176	0.180	0.187

Life satisfaction is measured on a 1-10 scale.
"*Trans*" interaction variables provide estimates for transitional countries relative to founder OECD countries.
Robust standard errors clustered by country in parentheses; *** p<0.01, ** p<0.05, * p<0.1 .
Other personal controls comprise a quartic polynomial in age, marital status (4 categories plus 1 omitted), employment status (5 categories plus 1 omitted), education (7 categories plus 1 omitted), gender, and gender interacted with the other controls.

In all the equations presented in Tables 4.1 and 4.2, we allow the income coefficients to differ between the OECD founders and the transitional countries. Any variable with a "Trans" suffix is the interaction of the prefixed variable with a dummy variable for transitional country status; thus the total effect of the prefixed variable on life satisfaction for a transitional country is the sum of the two variables with the same prefix.

Equation [1] in Table 4.1 is our simplest equation that relates each individual's life satisfaction just to their own income, with no reference group effects included. Personal characteristics are, however, controlled for (noting that controlling for education requires us to drop wave 2, so all these equations cover waves 3-5; i.e. 1998 – 2009). The equation indicates that an individual's life satisfaction is enhanced by an increase in *OwnIncome*, with a 10% increase in income resulting in a 0.012 increase in life satisfaction points (within the 1-10 life satisfaction scale). Individuals in transitional countries have a higher estimated life satisfaction return to an increase in their *OwnIncome* of 0.023 life satisfaction points (consistent with decreasing marginal utility of income) but the difference between this effect and that for OECD founders is not statistically significant.

Equation [2] supplements the variables in [1] with each individual's (intra-national) reference income. Again, we find no significant differences between transitional countries and OECD founders for either variable. The coefficient on *RefIncome* is negative (and almost identical for both sets of countries) while the coefficient on *OwnIncome* is positive and greater in absolute value than that for *RefIncome* (more so in transitional countries). For each country sub-set, a Wald test rejects the Easterlin Paradox (at $p<0.05$), so that an equi-proportionate rise in all incomes results in an estimated rise in life satisfaction (albeit considerably tempered by the impact of reference incomes).

Equation [3] is the counterpart of equation (2.3) excluding settlement type. Again we find that the coefficients on *OwnIncome* and *RefIncome* are positive and negative respectively. Considering just these terms, a Wald test shows that we cannot reject the Easterlin Paradox (at $p<0.05$) for OECD founder countries, but we again reject it for the transitional countries. Thus an equi-proportionate rise in all intra-country incomes is estimated to leave life satisfaction unchanged in OECD founder countries but to raise life satisfaction in transitional countries. The latter is consistent with an (attenuated) tunnel effect in lower income nations.

We find that a rise in a country's real Gross National Disposable Income relative to other countries has a substantial effect on individual life satisfaction. A 10% increase in an OECD founder country's *RelGNDI* increases life satisfaction for individuals in that country by 0.40 points. The effect is smaller in transitional countries (with the difference being statistically significant at the 10% level); in these countries the effect of a 10% increase in *RelGNDI* is for an increase in life satisfaction of 0.19 points. The smaller effect in transitional countries is again consistent with a tunnel effect whereby individuals in transitional countries place less importance on relative income effects than do residents of developed countries.

The findings from equation [3] are in line with those of Becchetti et al. (2013) for developed countries. For these countries, we find that the reference income result that underpins the Easterlin Paradox holds within the country but not across countries. If a country becomes richer (poorer) relative to its international counterparts then the life satisfaction of its residents rises (falls). Furthermore, this inter-national reference income effect has a much greater impact on life satisfaction even than the same percentage rise in an individual's own income.[31] We extend Becchetti et al.'s results to transitional countries, finding that the reference group effects are attenuated relative to those for developed countries. In particular, the intra-national Easterlin Paradox result no longer holds, while the inter-national reference income effect – while still present – is less marked than for developed countries.

In Table 4.2,[32] we enrich our results by adding the settlement dimension. Equation [4] in Table 4.2 is the simplest regression (but with the inclusion of wave and country fixed effects) to test the hypotheses that: (a) within a particular country-type, individuals have different life satisfaction according to their settlement-type, and (b) that within a particular settlement-type, individuals have different life satisfaction according to their country-type. In this regression, large city is the base category so the coefficients should be interpreted relative to life satisfaction in large cities. Again, the variables with a "Trans" suffix are the interaction of the prefixed variable with a dummy variable for transitional country status. In keeping with some prior regional science literature, the estimates indicate that life satisfaction is (significantly) higher in large cities than in other settlement types within transitional countries. In developed countries, the typical pattern is shown whereby rural/town satisfaction is higher than in small cities with a further decline to large cities, albeit with none of the developed country settlement-type effects being statistically significant.

Equation [5] is our main equation as specified in (2.3). It regresses life satisfaction (using OLS) on wave and country fixed effects, personal characteristics (including education), own income, (within country) reference income for like individuals, and GNDI of the country relative to that of the EU15. Each of the income coefficients is differentiated according to country-settlement type. It is estimated on data surveyed from waves 3 to 5 in order to include the education variables (which are significant for rural areas and small cities). This provides us with data from 1998-2003 (wave 3) to 2008-2009 (wave 5). The last wave is useful, in particular, since

[31] In our discussion of the results from Table 4.2, we examine this result further, discussing whether the *RelGNDI* result represents an absolute income effect or a relative income effect.

[32] We drop the reporting of standard errors in Table 4.2 to keep the table manageable; statistical significance is still signalled through the standard star system.

it includes the immediate post Global Financial Crisis period which provides considerable cross-country and cross-time variation.

In order to lengthen our sample still further, we extend the estimation period to include wave 2 in equation [6], but this is at the expense of having to omit education controls. Results are qualitatively similar to those from waves 3 to 5. We prefer to include controls for education given their significance and their differing effects across settlement types, and so we do not discuss the results from equation [6] further here.

Equation [7] re-estimates [5] for the same sample as in [5] but using ordered logit as the estimation technique; results are presented as odds ratios, so a coefficient that is greater (less) than unity corresponds in direction of effect to an OLS coefficient that is greater (less) than zero. As found in prior papers, the ordered logit results produce very similar results to the OLS results. All coefficients that are significant at 5% in [5] are significant and of the same sign in [7] (albeit with two coefficients significant at 10% in the latter) and there is no coefficient that is significant at the 5% level in [7] that is not significant and of the same sign in [5].[33]

We have also estimated [5] using other comparators within the *RelGNDI* variable. First, we used USA GNDI as the comparator and second, we used the mean of USA and EU15 GNDI as the comparator. Results are very similar to those in [5]. We note that this corresponds to what may be expected mathematically. Countries are surveyed in different years within each wave (e.g. Wave 3 covers 1998 to 2003) and we express each country's GNDI relative to the comparator's GNDI in the country's specific survey year. Thus we do have variation within each wave for comparator GNDI.

Nevertheless, this differentiation may be overshadowed by the across-wave variability of comparator group GNDI, the latter being picked up by the wave fixed effects. Because of the close similarity in results, we do not report these additional estimates, but we return to the appropriate interpretation of our *RelGNDI* results in the concluding section.

[33] In addition to the results presented here, we have estimated settlement-type corollaries of [1] and [2], with similar findings. *OwnIncome* is positive for all country-settlement types in the corollaries to [1] and [2] while *RefIncome* is negative for all country-settlement types in the corollary to [2]. Given that [5] encompasses these equations, we do not reproduce them here.

Table 4.2: Life satisfaction equations by country-type including settlement-type

Dependent variable: ***Life satisfaction***	**[4]**	**[5]**	**[6]**	**[7]**
Rural (<5K)	0.113	-0.867	-0.0485	0.636
Town (5-20K)	0.115	0.859	0.844	2.680
SmallCity (20-100K)	0.0568	-0.229	0.963	0.620
Rural-Trans	-0.342**	0.643	0.0354	1.570
Town-Trans	-0.284*	0.0596	-0.488	0.931
SmallCity-Trans	-0.284**	-0.0103	-0.740**	1.029
*OwnIncome*Rural*		0.379***	0.356***	1.383***
*OwnIncome*Town*		0.327***	0.357***	1.309***
*OwnIncome*SmallCity*		0.327***	0.315***	1.301***
*OwnIncome*LargeCity*		0.364***	0.380***	1.352***
*OwnIncome*Rural-Trans*		0.0725	0.120	1.029
*OwnIncome*Town-Trans*		0.0631	0.0721	1.052
*OwnIncome*SmallCity-Trans*		0.159**	0.191**	1.125*
*OwnIncome*LargeCity-Trans*		-0.0203	-0.0497	0.956
*RefIncome*Rural*		-0.376***	-0.318***	0.723***
*RefIncome*Town*		-0.354***	-0.357***	0.745***
*RefIncome*SmallCity*		-0.335***	-0.306***	0.764***
*RefIncome*LargeCity*		-0.362***	-0.363***	0.742***
*RefIncome*Rural-Trans*		0.0393	-0.131	1.074
*RefIncome*Town-Trans*		0.119	-0.0309	1.118
*RefIncome*SmallCity-Trans*		0.0302	-0.110**	1.036
*RefIncome*LargeCity-Trans*		0.186	-0.0119	1.201*
*RelGNDI*Rural*		4.160***	2.154*	27.86***
*RelGNDI*Town*		4.300***	2.217*	30.68***
*RelGNDI*SmallCity*		3.926***	2.041*	21.91***
*RelGNDI*LargeCity*		4.235***	2.258**	28.55***

Dependent variable: ***Life satisfaction***	**[4]**	**[5]**	**[6]**	**[7]**
*RelGNDI*Town-Trans*		-2.188*	-0.229	0.175
*RelGNDI*SmallCity-Trans*		-1.947	-0.123	0.233
*RelGNDI*LargeCity-Trans*		-2.555**	-0.665	0.140*
Constant	7.523***	10.07***	8.992***	n/a
Observations	62,383	62,383	77,630	62,383
No. of Countries	27	27	27	27
Waves included	3 - 5	3 - 5	2 - 5	3 - 5
Wave fixed effects	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y
Education controls	N	Y	N	Y
Other personal controls	N	Y	Y	Y
Estimation method	OLS	OLS	OLS	OLogit
R^2	0.117	0.188	0.168	n/a

Life satisfaction is measured on a 1-10 scale.
"*Trans*" interaction variables provide estimates for transitional countries relative to founder OECD countries.
"*Rural, Town, SmallCity, LargeCity*" variables provide estimates by settlement-type, defined by population size.
LargeCity is the omitted category for the settlement-type intercept variables.
*** p<0.01, ** p<0.05, * p<0.1 using robust standard errors clustered by country.
Odds ratios presented for ordered logit (OLogit).
Other personal controls are as listed below Table 4.1.
Sample for [4] is chosen to be consistent with sample in [5], and so differs from that shown in Figure 3.3; also note that [4] controls for country and wave fixed effects.

Given the similarity of results across the various specifications, we confine our discussion to the findings from [5], with reference also to the naïve results from [4]. The discussion exploits the results of Wald tests of joint coefficient significance[34] using $p<0.05$ significance level unless otherwise specified. Our findings can be summarised concisely as follows.

First, no settlement-type intercept dummy is positive either for OECD founders or for transitional countries in the full equation; thus there are no (statistically significant) differences in life satisfaction by settlement-type in either country-type once other factors are controlled for.

[34] For instance, to test whether the Easterlin hypothesis holds for transitional country rural settlements, we test whether the coefficients on *OwnIncome*Rural* + *OwnIncome*Rural-Trans* + *RefIncome*Rural* + *RefIncome*Rural-Trans* = 0.

Second, *OwnIncome* has a positive relationship with life satisfaction in all country- and settlement-types. Furthermore, the coefficients on *OwnIncome* are very similar across country- and settlement-types.[35]

Third, *RefIncome* has a negative relationship with life satisfaction in all country- and settlement-types. The (within country) Easterlin Paradox holds for all settlement-types in OECD founders and in rural areas in transitional countries. However, the pure form of the Easterlin Paradox does not hold in non-rural settlements in transitional countries. Thus, relative to founder OECD settlements and relative to transition country rural settlements, there is a form of tunnel effect in non-rural transition country settlements.

Fourth, an increase in *RelGNDI* raises life satisfaction in all country- and settlement-types. The effect of *RelGNDI* on life satisfaction in transitional country large cities is smaller than for founding OECD large cities. In addition, transitional country large cities place a lower weight on *RelGNDI* than do transitional country rural and town areas.[36] These results are again consistent with a tunnel effect for transitional countries that is most prominent in vibrant areas (cities) so that an increase in foreign incomes relative to home incomes is not viewed as negatively in these more mobile areas compared with more stagnant areas.[37]

The third and fourth sets of findings are crucial. Prior literature finds that the Easterlin Paradox holds in stagnant, immobile areas but not in faster developing, mobile areas (which are characterised by tunnel effects). We conjecture that rural transitional economy areas are stagnant and immobile (relative to urban centres in transitional economies) and hence share the OECD founder Easterlin Paradox result, while the larger population areas in transitional economies are more up-and-coming and so do not share the Easterlin Paradox result.

Furthermore, not only are there intra-country tunnel effects in more mobile transition country settlements, but these tunnel effects operate also at the inter-country level. Thus, residents in transition country cities are less negatively affected by income increases elsewhere whether these increases are within the country or in comparator countries.

[35] The single exception is that *OwnIncome* has a higher impact on life satisfaction in transition country small cities relative to founder OECD small cities and relative to transitional country large cities.
[36] Transitional small city effects are in between those of the larger and smaller settlement sizes, though this last result is not significant ($p=0.11$).
[37] Other than the transitional country large city result, the only other case where a country-settlement type has a significantly different *RelGNDI* effect than in other country-settlement types is that OECD founder smaller cities place less weight on this variable than do other OECD founder settlements (though their effect is not significantly different to that in transition country small cities).

The first set of results is also important. Unlike in equation [4] which has no income variables or controls (other than wave and country fixed effects), settlement dummies are not significant for either country type in [5]. Thus if personal characteristics and preferences are fixed, then we cannot reject the notion of spatial equilibrium since (on average) residents from one settlement-type do not increase their life satisfaction by shifting to a differing settlement-type. However, if personal characteristics and/or preferences are not fixed – and specifically if they change as a result of migration – then our results could still be consistent with a change in an individual's life satisfaction if they migrate across settlement type. The issue of whether personal preferences and characteristics change upon migration is an open question that merits further research.

Taken overall, our results provide strong support for the hypothesis that the impact of reference and relative incomes depends on whether the individual is located in a country and/or settlement type that is mobile versus one that is stagnant. Our findings show that this is not simply a developed versus transitional country dichotomy or rural versus urban dichotomy. Rural transition country residents are akin to their founder OECD counterparts in their attitudes to others' success, while large city transition country residents are less likely to experience others' success negatively.

5. Conclusions

The Easterlin Paradox has cast a long-lasting shadow over the proposition that raising incomes across a country raises subjective wellbeing (life satisfaction) for individuals in that country. The strictest form of the paradox indicates that an equi-proportionate rise in all incomes within a country has no effect on life satisfaction. The widespread quest to raise incomes within countries is therefore called into question. The recent work of Becchetti et al (2013) casts a new light on the Easterlin Paradox by providing evidence that inter-country incomes matter, so a country can raise the life satisfaction of its residents by increasing its country income relative to those of its comparators.

A second set of researchers has analysed whether life satisfaction is higher or lower in urban relative to rural areas. Findings in this literature have either been inconclusive or have found that average wellbeing in some types of settlement outweigh that of other settlement types, but only for certain subsets of countries.

We unify these two areas of study by testing whether life satisfaction differences between rural and urban areas reflect differing emphases placed on income relativities in different areas. As well as differentiating by four settlement-types (rural, town, small city, and large city), we differentiate also by country-type (founder OECD versus transitional economies). We therefore bring inter-personal relativity effects (at both intra-national and inter-national levels) face-to-face with the rural-urban wellbeing literature. Our estimates are based on data from multiple waves of the European and World Values Surveys covering 27 countries (16 OECD founders and 11 transitional economies).

We find that *OwnIncome* (an individual's own income) has a positive relationship with life satisfaction that is similar across all country- and settlement-types. We find also that *RefIncome* (the income of like individuals in the same country in the same year) has a negative relationship with life satisfaction in all country- and settlement-types. The within country Easterlin Paradox holds for all settlement-types in OECD founders and in rural settlements in transitional countries. However, the pure Easterlin Paradox does not hold in non-rural settlements in transitional countries. Thus, relative to founder OECD settlements and relative to transition country rural settlements, there is a form of tunnel effect in non-rural transition country settlements.

Consistent with the more aggregated results of Becchetti et al, we find that an increase in *RelGNDI* raises life satisfaction in all country- and settlement-types. This extends the results of that study which established this result just for a set of developed countries and with no testing for settlement type differences. We find, however, that the effect of *RelGNDI* on life satisfaction in transitional country large cities is smaller than for founding OECD large cities. In addition, transitional country large cities place a lower weight on *RelGNDI* than do transitional country rural and town areas. These results are again consistent with a tunnel effect that is more prominent in vibrant areas (cities) so that an increase in foreign incomes relative to home incomes is not viewed as negatively in more mobile settlement types compared with more stagnant areas.

One additional key finding is that once all variables in the model are controlled for, there are no differences in life satisfaction by settlement-type in either OECD founders or transitional countries. Thus we cannot reject the hypothesis that a spatial equilibrium holds across settlement types in both country-types (provided preferences are fixed before and after migration).

Two potential extensions to this research could be considered. First, our interpretation of the *RelGNDI* result as a relative rather than an as an absolute income effect relies on identification from the within wave movements in national income. Given that this provides only weak identification of the relative effect, it is possible that our relative inter-national income finding may reflect (wholly or in part) an absolute life satisfaction effect derived from the impact on life satisfaction of an increase in national income that is over and above the effects derived from an increase in own income. For instance, higher national income may enable provision of better health or education services to the populace that increase life satisfaction across the country. The relative income interpretation of the *RelGNDI* effect is consistent with the standard cross-country Easterlin Paradox result that (developed) country residents do not experiences increases in life satisfaction over time, whereas the absolute income interpretation is consistent with the Stevenson and Wolfers results that rising income does raise national levels of life satisfaction. At the policy level for an individual country, either interpretation yields the same imperative: since governments must take other countries' national incomes as given, either interpretation of the *RelGNDI* result implies that a government can (ceteris paribus) increase its own citizens' wellbeing through an increase in its own country's GNDI.

Second, while we cannot reject a spatial equilibrium under the assumption of fixed preferences, we may not be able to do so (especially for transitional countries) if preferences change as a result of migration. For instance, if a transitional country rural resident moves to a large city – and if their preferences regarding relative incomes then change to the norm for transitional country large cities – they will view higher relative incomes elsewhere (intra-nationally and inter-nationally) less negatively. This will raise their wellbeing according to the estimates here, whereas their wellbeing due to relative incomes would not change if their preferences were fixed. Thus the question of whether personal preferences (and also personal characteristics, such as education) change upon migration – and whether these changes then affect an individual's life satisfaction – is an open question that merits further research.

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