Does Money Buy Me Love? Testing Alternative Measures of National Wellbeing

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Abstract

Many aggregate measures of wellbeing and sustainability exist to guide policy-makers. However, the power of these aggregate measures to predict objective wellbeing outcomes has received little comparative testing. We compile and compare a range of aggregate wellbeing measures including: material measures (e.g. Gross Domestic Product per capita), surveyed measures (e.g. life satisfaction) and composite measures (e.g. Human Development Index) covering a range of countries. We test the predictive power of wellbeing measures for an objective indicator of how people value countries' relative attractiveness. The objective indicator is net migration over a fifty year timespan, indicating people's revealed preference (re)location choices. The paper examines relationships amongst cross-country wellbeing and sustainability measures; and examines how New Zealand compares with other countries according to these measures. Based on models of spatial (dis)equilibrium and migration, we present tests of the predictive power of alternative aggregate measures for international migration outcomes. We find that both material and life satisfaction outcomes are important determinants of the choice to migrate.

JEL codes

A13; E01; J61; R23

Keywords

Aggregate wellbeing; life satisfaction; gross domestic product; migration

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1. Introduction

Although material prosperity in most nations, including New Zealand, has increased over the past fifty years, many people suffer from uncertainties and anxieties, social and economic divisions are widening, and concern is growing about environmental degradation. Life satisfaction and happiness have not changed much in many developed countries despite decades of rising GDP per capita (Easterlin, 1974; Layard, 2011; Helliwell et al, 2012). Nevertheless, policy-makers in most countries do aim to improve living standards sustainably into the future. Two questions then arise: *Are policy-makers' current behaviours sustainably increasing wellbeing?* and *How would they know that this is the case?* In order to answer these questions, policy-makers and researchers typically use one or more aggregate measures of wellbeing and/or sustainability as inputs into their evaluations of whether policies and outcomes are on a desirable track.

Many measures of aggregate wellbeing and sustainability exist. We compile a range of existing aggregate wellbeing measures including: material measures such as GDP per capita (*GDP(pc)*), surveyed measures such as life satisfaction, and composite measures such as the Human Development Index (*HDI*), covering OECD and a wider range of countries. We describe the relationships between alternative wellbeing measures and describe how New Zealand fares relative to other countries across these measures. We then test the predictive power of wellbeing and sustainability measures for an objective (revealed preference) indicator of how people value countries' relative attractiveness. The objective indicator that we adopt is a long history (fifty years) of net migration outcomes across developed countries, indicating people's preferred (re)location choices.

As of 2010, New Zealand was ranked third globally on the *HDI*, sixth by Gallup for surveyed happiness, but only thirty-third on *GDP(pc)*. Furthermore, in 2005, New Zealand ranked fourth worst out of 25 developed countries on a measure of Ecological Footprint (*EcoFprint*), a well-known sustainability metric. These measures cast very different light on New Zealand's broad social, economic and sustainability performance. Given these differences, which measure(s) should policy-makers and researchers pay heed to?

Following Waring (1989), Stiglitz, Sen and Fitoussi (SSF, 2009) argue that "What we measure affects what we do; and if our measurements are flawed, decisions may be distorted". SSF argue that work is required to improve measures of sustainable economic performance and social progress incorporating, *inter alia*, inequality as well as average performance outcomes. In this paper we do not create new indices of wellbeing, sustainability or inequality, but instead use existing well-known measures to explore the information content of alternative indices.

The power of competing aggregate indices to predict objective outcomes valued by people has received little comparative testing. Such objective outcomes might include mental and physical health outcomes, anthropometric status (e.g. stature) and observed life-choices designed to improve an individual's or household's wellbeing. In this paper, we concentrate on this last aspect. We use net migration over fifty years – divided into ten five-year windows – as a summary revealed preference indicator of national wellbeing as observed by potential and actual migrants. In our tests, this variable is our dependent variable, observed (as a panel) for the initial 24 OECD countries over fifty years.

We explain migration outcomes using a range of well-known aggregate wellbeing indicators. Our data include long series on *GDP(pc)* and also Gross National Income per capita (*GNI(pc)*), population, male and female life expectancy, measures of life satisfaction, inequality, the *HDI*, *EcoFprint* and degrees of globalisation. Our key contribution is to demonstrate that multiple wellbeing measures are required to explain migration outcomes. None of the above measures is sufficient by itself to explain the choices that people make to establish what they perceive as a better life for themselves, their families and their descendants.

The initial part of our study is descriptive. First, we examine the relationships amongst key wellbeing and sustainability measures across a large range of countries and we examine how New Zealand compares with other countries according to these performance measures. The second part of the study presents tests of the predictive power of alternative measures for net international migration outcomes.

The results are relevant for policy-makers in New Zealand and elsewhere. While there is increased interest amongst officials in New Zealand in examining broad measures of wellbeing (Gleisner et al, 2011), some narrower GDP targets have been mooted (e.g. Cullen, 2005; Key, 2010). This narrower approach contrasts with the policy of the UK Prime Minister who has argued for the need to focus not just on GDP, but on general well-being (Cameron, 2010), and the UK government has established a national forum to measure wellbeing. Our study informs such work by providing tests of a range of wellbeing and sustainability measures to establish whether indices that incorporate factors beyond those captured by purely material-based measures, have predictive content. If they do, then these measures – or at least the factors within them – need to be included in evaluating the desirability of policy choices.

2. Prior Studies and Conceptual Model

To evaluate aggregate wellbeing outcomes, and despite difficulties of aggregation over individuals (Blackorby and Donaldson, 1990), aggregate indicators inevitably play a role in guiding policy-makers and researchers. There exists a range of national wellbeing measures from material measures such as *GDP(pc)* and *GNI(pc)*, to surveyed happiness and life satisfaction (Layard, 2011), to composite measures such as the *HDI* (UNDP, 2010), and sustainability measures such as Genuine Savings (World Bank, 1997; Hamilton and Clemens, 1999; Hamilton and Withagen, 2007) and *EcoFprint* (WWF, 2008). Each of these measures has some theoretical underpinning that justifies its use as an indicator of wellbeing and/or sustainability for a country.

In recent years, there has been a plethora of composite indices, in addition to the *HDI*, created to proxy aggregate country wellbeing and/or sustainability. Such indices include the New Economics Foundation (NEF) Happy Planet Index (*HPI*), the OECD's Better Life Index (*OECD-BLI*) and the Yale Center for Environmental Law and Policy's Environmental Performance Index (*EPI*). These indicators generally have a less well-developed theoretical underpinning than the measures outlined above.

For sustainability, a long-term economic indicator is Genuine Savings, derived from a formal model of how wellbeing can be sustained over time. It focuses on changes in an economy's capabilities (stocks) which constitute the degree to which current generations pass on opportunities to future generations to maintain their wellbeing. The theory assumes some substitutability between capital assets – produced, natural, human and social. In contrast, *EcoFprint* privileges natural capital above all other forms of capital and is based on the implied desirability of national self-sufficiency. In practice, there are too few country estimates of Genuine Savings to enable its use in cross-country panel regressions. By contrast, a 25 country panel exists (over 1960 - 2005) for *EcoFprint*. Despite its limitations in terms of economic theory, we utilise the *EcoFprint* measure as one (albeit potentially flawed) indicator of sustainability.

In their overarching study, SSF say that work is required to: obtain better aggregate measures of economic performance; to shift emphasis from measuring economic production to measuring people's well-being; to adopt better measures of sustainability; and to increase focus on inequality measures. It can be argued that national measures may be insufficient where world-views differ for groups within a country. For example, in New Zealand, indigenous experts have argued that additional wellbeing measures may be applicable for Māori that may not be applicable for Pākehā (Durie, 2006). While potentially an important issue worthy of further study, data limitations mean that we concentrate solely on national measures of wellbeing and sustainability in this paper.

To understand whether measured increases in wellbeing are sustainable, one must have some metric against which to test the predictive power of alternative indices. As yet, there have been few such studies (for limited examples, see: Ferreira and Vincent, 2005; and Ferreira et al, 2008). None of these studies examines the impact of alternative measures of wellbeing or sustainability on migration choices.

Modern economic geography, built around the concept of adjustment towards spatial equilibrium, recognises that migration is an equilibrating mechanism that operates when one region has greater expected utility for residents than does another region. Glaeser and Gottlieb (2009) summarise the spatial equilibrium concept by assuming that the utility level of individuals in any region i, $U(G_T^i, G_N^i, \theta^i)$, is determined by their consumption of traded goods (G_T^i), non-traded goods (G_N^i) and local amenities (θ^i). Given the individual's budget constraint and the assumptions that traded goods prices follow the law of one price and that non-earned income is unaffected by location, utility can be expressed by the indirect utility function, $V(Y^i, P^i, \theta^i)$, where Y^i is locally-earned wage income and P^i is the price of non-traded goods (including housing services). Both Y^i and P^i are endogenous and so reflect the population and productive characteristics of a region. In spatial equilibrium:

$$V(Y^i, P^i, \theta^i) = \bar{U} \tag{1}$$

where $\bar{U}$ is the (equal) level of utility that would be obtained by locating in any other region. Where $V(Y^i, P^i, \theta^i) \neq \bar{U}$, we can postulate a migration function such as:

$$dL/dt = M(V - \bar{U}) \tag{2}$$

where L is population in region i, t represents time, and $M_V > 0$ (Grimes, forthcoming). For instance, *ceteris paribus*, if a spatial equilibrium initially exists but then local amenities in i decline (contributing to a reduction in wellbeing), there will be out-migration from region i even though relative incomes have not initially altered. Indeed, to restore spatial equilibrium, the migration mechanism must eventually induce either an offsetting rise in local incomes (Y^i) or a reduction in local living costs (P^i). This theoretical basis demonstrates that incomes cannot, in general, be expected to be a sufficient statistic to describe absolute or relative regional (or national) wellbeing.

At the individual level, following Dustmann (2003) and McCann et al (2010), we can model prospective migrants as forward-looking optimisers under conditions of uncertainty. An individual, j, has the option of living in the domestic (d) or foreign (f) country. She has an age-related (a) single-period indirect utility function (U^a) defined over wages (w_t) and non-pecuniary amenities (n_t) received in the country in which she resides in period t, and has an age-related value function (V^a) conditional on country location [where y_t=1 (resp. 0) denotes living in the foreign (resp. domestic) country; so $|\Delta y_t|$=1 represents migration to or from the domestic country]; δ is the individual's rate of time preference. Each location switch incurs a fixed cost, F^j (which, for expositional simplicity, is assumed to be the only parameter that varies across individuals). An individual migrates (from d to f) if and only if:

$$[U^a(w_t^f,n_t^f) - U^a(w_t^d,n_t^d)] + \delta[E_t(V^a_{t+1} \mid y_t =1) - E_t(V^a_{t+1} \mid y_t =0)] > F^j(|\Delta y_{t-1}|) \tag{3}$$

Decision-making in accordance with (3) yields a range of possible outcomes. If the individual values wages highly early in life ($\partial U^{a'}/\partial w > \partial U^{a''}/\partial w$ where a'<a'' (i.e. where the person is younger) and values non-pecuniary amenities more in later life (i.e. $\partial U^{a'}/\partial n < \partial U^{a''}/\partial n$) then, depending on the size of F^j, it may be optimal for the individual to migrate from a high amenity (domestic) country to a high-wage (foreign) country early in life, and later migrate back to the domestic country despite incurring two fixed migration costs. If the individual considers that current domestic non-pecuniary amenities are not sustainable, this may lower $E_t(V^a_{t+1} \mid y_t =0)$ favouring emigration today. This framework provides a conceptual basis, consistent with adjustment towards spatial equilibrium, to test how residents at different life-stages value current and future (sustainable) pecuniary and non-pecuniary benefits. In the current study, we aggregate across all age groups, but the framework signals potential extensions that disaggregate migration decisions by age (and potentially also by different ethnicities or other social groups with differing F^j or differing utility functions).

To operationalize the test implicit in (3), we require data on migration choices, measures of contemporaneous pecuniary and non-pecuniary wellbeing affecting U^a, and a measure of sustainability affecting V^a. We describe our data corresponding to these facets in the next section.

We denote net migration to country *i* in year t as M_{it}, and material, surveyed, composite and sustainability measures in country *i* at time *t* as G_{it}, N_{it}, H_{it}, S_{it} respectively. The global value in t for each of these measures is denoted G_{*t}, N_{*t}, H_{*t}, S_{*t} respectively. Following the framework outlined in (3), we assume that: each of G_{it}, N_{it} and H_{it} affects $U^a(w_t^d,n_t^d)$; each of G_{*t}, N_{*t} and H_{*t} affects $U^a(w_t^f,n_t^f)$; S_{it} affects $E_t(V^a_{t+1} \mid y_t =0)$; and S_{*t} affects $E_t(V^a_{t+1} \mid y_t =1)$. We can then test significance of each of the arguments in the regression:

$$M_{it} = \alpha_0 + \alpha_1(G_{it} - G_{*t}) + \alpha_2(N_{it} - N_{*t}) + \alpha_3(H_{it} - H_{*t}) + \alpha_4(S_{it} - S_{*t}) + \mu_{it} \quad (4)$$

where $\mu_{it} = \varepsilon_{it} + \lambda_i + \lambda'_t$

λ_i is a country fixed effect to account for constant, unobserved country-specific wellbeing or sustainability factors; λ'_t is a time fixed effect that captures global influences on migration decisions (e.g. security concerns that affect F^j) that affect migration for all countries in time t equally; ε_{it} is the residual.

In our panel regression, we can replace all of the foreign variables with time fixed effects, λ''_t, since these variables are common to all countries. We can then estimate the equation:

$$M_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 N_{it} + \alpha_3 H_{it} + \alpha_4 S_{it} + \mu_{it} \quad (5)$$

where $\mu_{it} = \varepsilon_{it} + \lambda_t + \lambda_i$; and $\lambda_t = \lambda'_t + \lambda''_t$

Equation (5) is estimated as a panel regression with a number of measures included to proxy each of G, N, H and S. In interpreting the results, it should be noted that, *ceteris paribus*, the likelihood of migration will be higher (lower) for individuals with low (high) F^j. Thus regression results based on (5) can most reliably be taken as tests of wellbeing factors that are taken into account by migration-prone (low F^j) individuals rather than for those who may be resistant to migration even where conditions are better abroad than at home. We henceforth refer to the former group as potential migrants.

3. Wellbeing and Sustainability Data

There is a wide range of alternative wellbeing and sustainability measures. We analyse relationships amongst them to examine the extent to which differing measures provide materially different information. Initially we do so using a 2010 (or latest available) cross-sectional country snapshot for fourteen measures. These measures cover material wellbeing, surveyed wellbeing, inequality indicators, composite measures, sustainability measures, objective wellbeing measures and two indices of international connectedness of countries (though these latter indices may be interpreted more as contextual variables rather than as wellbeing indicators *per se*). Data sources are listed below Table 1.

The main objective wellbeing measure is life expectancy at birth (*LifeExp*). We supplement this measure with the ratio of female to male life expectancy (*Fem/Male*). A low value of this ratio may be an indicator of discrimination against females or of poor primary health care systems that result in high maternal mortality rates. The two connectedness indicators are measures of economic globalisation (*Eco-Glob*) and social globalisation (*Soc-Glob*) (Dreher, 2006; Dreher et al, 2008).

Two material wellbeing measures are reported. The first is GNI per capita at purchasing power parity (PPP). The second is GDP per capita at PPP. Because GNI relates to incomes of residents whereas GDP relates to production within a country (for which some returns may accrue to foreigners), we consider that GNI is the better indicator of material wellbeing for a country's residents.

Surveyed wellbeing includes two measures of life satisfaction. The first is *LS-Mean*, a country's Mean Life Satisfaction in its most recent World Values Survey (WVS). Prior values (used in the panel regressions) rely on interpolated values between surveys for each country; the first surveyed value is extended back to the start of the sample for each country, while the latest surveyed value is extended forward to the end of the sample. The second measure is *LS-HPI*, a Life Satisfaction measure compiled by the New Economics Foundation (NEF) for its Happy Planet Index (for 25 OECD countries). It is available for every fifth year over the period 1960-2005. This series is based on WVS (where available) but also uses modelled data based on other life satisfaction surveys and on other series (e.g. from UNDP's Human Development Report) to extend the data back for each country to 1960. The series' construction is detailed in Abdallah et al (2008). Importantly, for our panel regressions, no stock or flow measure of migration is used in the modelling of *LS-HPI*; nor are income variables included in its modelling. Because of its modelled component, *LS-HPI*, though based on life satisfaction measures, is not necessarily consistent with the WVS measure.

One inequality measure is derived from the World Values Survey. It is the standard deviation of responses within a country to the WVS Life Satisfaction question (denoted *LS-Sdev*), which is interpolated/extrapolated as for *LS-Mean*. A high score for this measure indicates greater inequality of life satisfaction within a country. The second inequality measure is a standard Gini coefficient (expressed as a percentage) relating to income inequality (*Gini*). The CIA Factbook measure is used in our descriptive work as this source provides data for a wide range of countries. The latest available measure (provided it dates from at least 1995) is used. In our panel regression analysis, we use the OECD Gini measure which is available every fifth year for the period 1980-2010. A high value for either Gini measure denotes greater inequality of income.

Two composite measures are reported. The first is the (updated definition of the) UNDP's Human Development Index (*HDI*) for 2010. Data have been compiled for every fifth year over the period 1980-2010. The second is the OECD's equally-weighted Better Life Index (*OECD-BLI*), just for 2010. Other composite indices now abound (e.g. the Legatum Prosperity Index and Genuine Progress Indicators) but the *HDI* and *OECD-BLI* are the most commonly cited internationally-comparable composite indices. In addition, the New Economic Foundation (NEF) Happy Planet Index (HPI) is a composite measure, but we include its three component measures (*LifeExp*, *LS-HPI* and *EcoFprint*) directly (albeit in an unrestricted functional form, unlike the restricted form of the HPI).

Finally, we report two environmental sustainability measures. The first is the NEF's *EcoFprint* measure, in turn sourced from World Wildlife Fund (WWF, 2008). These data are available for every fifth year for the period 1960-2005 from NEF for 25 OECD countries. A high *EcoFprint* score indicates a greater degree of unsustainable development according to the theoretical underpinning of this measure (an *EcoFprint* greater than one indicates that a country requires more than its current land area to support itself). The second measure is a composite index of environmental outcomes, the Environmental Performance Indicator (*EPI*) compiled by the Yale Center for Environmental Law and Policy (Yale University). The 2010 series is used here. A high *EPI* score indicates that a country is performing well in terms of its environmental outcomes.

We provide a scatter-plot for 2010 (or using latest available prior data) of *GNI(pc)* against each of the other series to assess: (a) the difference in information content in each series relative to information on average material wellbeing; and (b) how the nature of the relationship changes according to country wealth. These scatter-plots are shown as Figures 1 to 13; each figure also reports the simple correlation coefficient (r) between the two series. In some cases, it is clear from the graph that the correlation coefficient would be higher if a different functional form were used for the correlation but, for purposes of consistency, the simple linear relationship is shown in each case.

From Figure 1, the two material measures contain very similar snapshot information (r=0.91) and so either *GDP(pc)* or *GNI(pc)* can be used as a snapshot measure of material resources for a country. (The two major outliers in the south-east of the graph are oil/gas producers, Kuwait and United Arab Emirates.) We note that trends in the two series could diverge over time for a country running a persistent current account surplus (deficit), thereby building up foreign assets (liabilities) creating a growing wedge between production and incomes in a country. We subsequently analyse correlations of indicators over the full sample period.

Life expectancy (Figure 2) increases sharply up to a per capita income level of $10,000 p.a. (in 2010 USD); but thereafter there is little further increase in mean life expectancy at birth as countries become richer. The female/male life expectancy graph (Figure 3) shows a complex relationship. There is a clear positive relationship between this ratio and income for poor to medium income countries (up to a *GNI(pc)* level of around $20,000). Above this level, the ratio drops back to a stable level independent of income. Some of the countries with the highest ratio of female to male life expectancy are former Soviet countries where the high ratio is due to low male life expectancy associated, *inter alia*, with alcohol abuse. Countries with low levels of the ratio generally reflect high female mortality rates in very low income countries (e.g. Bangladesh) and/or reflect the incidence of AIDS (Botswana, Lesotho, Swaziland).

Figures 4 and 5 indicate that richer countries are more highly connected to the rest of the world than are poorer countries both in terms of economic linkages and social linkages. Each of the correlations is strong (r=0.67 for economic globalisation and 0.81 for social globalisation respectively). In both cases, the relationship may be approximated as a logarithmic relationship with globalisation increasing as a country becomes richer but at a reduced rate. We stress that none of these graphs indicates causality in either direction, so we cannot conclude that higher income causes greater international connectedness or vice versa, or whether a third factor is responsible for the observed relationships.

The two life satisfaction series are graphed in Figures 6 and 7. Figure 6 provides the NEF's HPI modelled measure of life satisfaction for 25 OECD countries, while Figure 7 uses WVS data. There is a moderately strong positive relationship between the NEF's measure and average incomes (r=0.43). For the WVS measure (r=0.33), the positive relationship is evident up to a mean income of around $45,000 but not beyond that level. The dispersion of life satisfaction outcomes across countries appears to diminish as mean incomes rise towards $45,000. This may indicate that non-income elements which vary significantly across countries are more important for life satisfaction outcomes in countries that are, on average, poorer than in richer countries.

Inequality (standard deviation) of life satisfaction is also moderately related to mean country income (Figure 8). Life satisfaction inequality tends to fall as countries become richer (r=-0.43). Similarly, income inequality tends to fall as countries become richer (Figure 9). Thus wealthier countries tend to have lower Gini coefficients (r=-0.38). Nevertheless there remains a considerable degree of dispersion around this relationship at all income levels.

Figures 10 and 11 indicate that higher incomes are closely related to the two reported composite indices of human wellbeing, the *HDI* (r=0.71) and the *OECD-BLI* (r=0.80). The high correlation of income with each of these series suggests that neither measure adds a large amount of extra information on wellbeing relative to the *GNI(pc)* series. However, the shape of the relationship does change as income changes, so potentially providing some extra information. In the case of the *HDI*, the positive relationship with *GNI(pc)* is apparent up to a mean income of around $30,000 whereas the positive relationship extends to a cut-off of around $40,000 for the *OECD-BLI*. Above these cut-off points, the indicated level of wellbeing appears broadly constant as income rises further.

The two sustainability indicators provide quite different pictures of environmental outcomes from each other. According to the *EcoFprint* measure (Figure 12) richer OECD countries, on average have a higher ecological footprint than do less wealthy countries (r=0.59) and accordingly have less sustainable economies. By contrast, the *EPI* measure (Figure 13) indicates that wealthier countries have better overall environmental records than do less well-off countries (r=0.53). The *EPI* measure covers 131 countries compared with the 25 country *EcoFprint* series. Figure 14 presents a scatter plot for these two series against each other just for the 25 countries for which both measures exist. The correlation coefficient is low (r=0.11) but, to the extent that there is a correlation, the data suggest that countries with better environmental performance (*EPI*) have higher ecological footprints and hence are less sustainable according to that measure. Thus the sustainability indicators present an inconsistent picture of environmental performance.

A full complement of cross-sectional correlation coefficients between all fourteen series (using their 2010 or most recently available prior values) is shown in Table 1. In general, the inequality measures are negatively correlated with other wellbeing measures while almost all other wellbeing measures (other than *EcoFprint* and the female-male life expectancy ratio) are positively related to one another. Thus alternative measures show some consistency in broad wellbeing outcomes for countries. Nevertheless, the fact that many correlations are well below one indicates that alternative measures contain additional information relative to other measures.

Table 2 provides panel correlation coefficients measured over two separate time periods for wellbeing and sustainability series for which we have time series of data. (The panel correlation coefficient is the square root of the R^2 statistic for a panel regression of one variable on the other plus a constant, with the sign given by the sign of the regression coefficient in the panel regression.) Each of the ten series is measured every five years through to 2005, beginning either in 1960 or 1980. We use data in the form in which it appears in our tests in section 4; thus we use *log(GDP(pc))* and restrict our attention to the initial 24 OECD countries for which we have almost complete data. The bottom left portion of the table presents the correlation coefficients for the full 1960–2005 period for variables that have data covering this full period; the upper right portion presents coefficients for the 1980–2005 period. For reasons of space, we omit *log((GNI(pc))*; its correlation with *log(GDP(pc))* is 0.90 over 1980–2005, and it has similar correlations with the other variables as does *log(GDP(pc))*. For reasons of space, we also omit the variables used as control variables in the following section. The *Gini* coefficient used in Table 2 (and subsequently) is the OECD measure.

The table shows that *log(GDP(pc))* is highly positively correlated (r> 0.70) with both *LifeExp* and *HDI*, which, in turn, are highly positively correlated with each other (as expected, given that *LifeExp* is a component of the *HDI*). *HDI* therefore adds little to *log(GDP(pc))* in measuring differences in cross-country wellbeing. *log(GDP(pc))* is moderately positively correlated (0.40<r<0.70) with *LS-HPI* and it has a positive but small correlation with *LS-Mean*. Consistent with the cross-section, *EcoFprint* is moderately positively correlated with both *log(GDP(pc))* and *LS-HPI*; hence countries that are supposedly ecologically unsustainable tend to be richer and have higher life satisfaction than other countries.

Inequality is unequivocally negatively correlated with most other measures of wellbeing. For instance, *LS-Sdev* is moderately negatively correlated with each of *log(GDP(pc))*, *LifeExp*, *LS-HPI* and *HDI*; while *Gini* is moderately negatively correlated with *LS-HPI*. Thus, in an associative sense, inequality is lower in countries with higher incomes and higher life satisfaction. Again, no causality can be attributed in either direction for any of these correlations.

Before presenting tests of the predictive power of the various indicators, we describe how New Zealand (NZ) fares in relation to the indicators that have been presented. Each of Figures 1 to 14 indicates the point corresponding to New Zealand. Per capita GNI and GDP for the country is moderately high in relation to the full sample (Figure 1). However, for the "OECD" sample (which, in these figures, corresponds to countries in the NEF-sourced indicators, being the initial 24 members of the OECD (excluding Turkey) plus Mexico and Korea), New Zealand has the fifth lowest level of *GNI(pc)* even after PPP adjustments (Figure 6). Other than Mexico, New Zealand's *GNI(pc)* is barely above that of any of the other OECD countries, and is less than half that of the wealthiest countries.

On some other measures, but by no means all, New Zealand fares better. Table 3 provides actual and percentile rankings of New Zealand's performance (using 2010 or the most recent available prior data) according to each measure, both relative to the full sample and relative to the 24 earliest OECD members. New Zealand was the 24th country to join the OECD (in 1973). All 24 countries (with the possible exception of Turkey, a founder member of the

OECD) can be considered to have been "rich" countries at the start of our data sample (1960). Thus comparisons of outcomes post-1960 do not suffer from a selection bias that would occur if subsequent joining member nations of the OECD were included in the "OECD" sample (DeLong, 1988).

The samples for each measure differ since data availability differs across series. In each case, a lower absolute and/or percentile ranking signifies greater wellbeing; for instance, a percentile ranking of 1% for the Gini coefficient indicates that that country has extremely equal income distribution relative to other countries. For New Zealand, the Female/Male Life expectancy ratio is not relevant since that ratio appears to have information content only for countries that are considerably poorer than New Zealand; hence this measure is not discussed further below.

Based on the full samples, New Zealand ranks in the top third of countries for eight of the thirteen indicators. It falls out of the top third of countries for the two inequality measures (69^{th} and 38^{th} percentiles for *LS-Sdev* and *Gini* respectively) for *EcoFprint* (88^{th} percentile) and for the two life satisfaction measures (36^{th} and 51^{st} percentiles for *LS-HPI* and *LS-Mean* respectively). We note, however, that New Zealand performs highly on the 'competing' Gallup Survey of happiness (for which the country ranked sixth globally in 2010).

For the original OECD (OECD24) countries, New Zealand's rankings are less positive. It ranks in the top third of countries on only two of the thirteen measures: UNDP's *HDI* (21^{st} percentile) and *OECD- BLI* (17^{th} percentile). These are each composite indices reflecting their constructors' views of what constitutes greater wellbeing. New Zealand ranks in the bottom third of countries on seven of the thirteen measures: the two income measures, the two inequality measures, mean life satisfaction (WVS measure), ecological footprint and social globalisation (though the last of these may be considered a contextual variable rather than as an explicit measure of wellbeing). New Zealand ranks in the middle third of this sample for life expectancy, *EPI*, life satisfaction (HPI measure) and economic globalisation.

Tables 4 and 5 track New Zealand's absolute and percentile rankings within the OECD24 for the nine variables covered in Table 2, plus *log(GNI(pc))* for 1960, 1980 and 2005. All data are available for the last two of these periods; 1960 data are available for five variables. Again, a low (resp. high) percentile ranking denotes a beneficial (resp. detrimental) relative outcome. Figure 15 provides this percentile information visually.

The deterioration in New Zealand outcomes is clearly evident from Figure 15. In 1960, New Zealand ranked highly on per capita income, moderately on life expectancy and life satisfaction, and poorly only according to ecological footprint. By 1980, New Zealand ranked in the bottom quartile for six of the ten measures and by 2005, New Zealand ranked in the bottom quintile for seven of the ten measures. Nevertheless, it still ranked in the top quartile on the *HDI* and ranked in the second quartile on life expectancy and life satisfaction.

New Zealand's highly variable rankings – from high rankings for the composite wellbeing indicators (*HDI* and *OECD-BLI*) to very low (developed country) rankings on material wellbeing, inequality and ecological footprint, with only moderate rankings on life satisfaction measures – leaves open a major question: Which of the factors taken into account by each of these measures actually matters to individuals? It is to this question that we now turn.

4. Wellbeing, Sustainability and International Migration

In order to test the predictive content of the available indicators, we estimate an international migration relationship based on eq. (5). Specifically, we have sourced data from the World Bank (and, in turn, from United Nations Population Division) on the net total of migrants during the period; that is, the total number of immigrants less the total number of emigrants, including both citizens and noncitizens. Data are estimates for successive five-year periods. To derive estimates of net migration, the UN Population Division takes into account the past migration history of a country or area, the migration policy of a country, and influxes of refugees. The data to calculate these official estimates come from a variety of sources, including border statistics, administrative records, surveys, and censuses. When no official estimates can be made because of insufficient data, net migration is derived through the balance equation, which is the difference between overall population growth and the natural increase in population.

Each data point is therefore a five-year sum of net migration for each country. The first observation covers 1961-1965 (labelled 1965 in our database) and the last covers 2006-2010 (2010). Estimates are made for each of 216 countries for ten periods (covering 50 years). We express the five yearly net migration flow (*NMig*) as a ratio of the population (*Pop*) at the end of the previous period (e.g. the 2010 figure is the 2006-2010 migration flow divided by population in 2005). Population estimates are also sourced from the World Bank. Thus, including country (i) and period (t) subscripts, our dependent variable is $NMig_{it}/Pop_{it-1}$.

The explanatory variables are the variables that appear in Tables 4 and 5 plus the two globalisation variables (*Eco-Glob* and *Soc-Glob*) and an additional variable, the prior decade's growth rate in (PPP-adjusted) GDP per capita, *GDPgrowth* (i.e. the 1960 observation for $GDPgrowth_{it}$ is country i's GDP growth per capita between 1950 and 1960). All explanatory variables are entered with a lag (t-1) to avoid issues of endogeneity arising from current migration flows impacting on the values of the explanatory variables. Data are available for the full 50 year time period for: *GDP(pc)* - which we enter in logarithmic form, *LifeExp*, *Fem/Male*, *EcoFprint, LS-HPI* and *GDPgrowth*. Data are available for the shorter 30 year timespan for each of these variables plus: *log(GNI(pc))*, *HDI, Eco-Glob, Soc-Glob, LS-Mean, LS-Sdev and Gini*; all variables are defined below Table 1. *log(GNI(pc))* is our preferred per capita income measure, so we use this variable for the 1985-2010 estimates, and use *log(GDP(pc))* for the 1965-2010 estimates for which *log(GNI(pc))* is unavailable.

Some of the series are available only for OECD countries while, for variables available more widely, data quality issues are of greater concern for non-OECD than for OECD countries. We also expect that migration flows are less restricted between OECD countries than for migration flows from non-OECD countries to OECD countries. For these reasons, we restrict our migration estimates to OECD countries, and further restrict our analysis to the 24 OECD countries as at 1973 to avoid sample selection bias (DeLong, 1988).

The base equations for 1965–2010 and 1985–2010 respectively, are shown as equations (6) and (7):

$$NMig_{it}/Pop_{it-1} = \alpha_0 + \alpha_1 log(GDP(pc))_{it-1} + \lambda_t + \lambda_i + \varepsilon_{it} \quad (6)$$

$$NMig_{it}/Pop_{it-1} = \alpha_0 + \alpha_1 log(GNI(pc))_{it-1} + \lambda_t + \lambda_i + \varepsilon_{it} \quad (7)$$

Each base equation includes both time and country fixed effects. As discussed with reference to equations (4) and (5), the inclusion of time fixed effects proxies both for global conditions impacting on migration flows and for international norms for each of the explanatory variables. Thus, for instance, the per capita GDP and GNI terms in (6) and (7) are implicitly expressed relative to the OECD average level for those variables for each year. The country fixed effects proxy for country-specific characteristics and immigration policies that have a consistent effect over time.

Equations (6) and (7) model the impacts on net migration of average material wellbeing factors (and/or factors highly correlated with material wellbeing) as proxied by national accounts data. If migrants are driven to improve their lives solely by material concerns and/or by any factors highly correlated with material concerns (plus any constant differentials accounted for by the country fixed effect terms), then no other terms should be significant when added to (6) or (7). We test this hypothesis by adding other wellbeing and sustainability terms to these equations and testing for their significance. In doing so, we wish to test whether the added variables have significant explanatory power over and above the income terms in predicting migration flows.

Our test is therefore a stringent one. The added term has to be significant at the 5% level in an equation that includes itself plus the income term. If the variable is highly correlated with income it might be significant in a migration equation when entered by itself but may not be significant once the income term is included. Thus, any equation containing significant added terms unequivocally adds extra information to explain migration flows that is not contained in the base income variable.

Table 6 provides results for these tests for each of the two time periods. All potentially included variables are listed. The equation that includes solely the income term is shown together with any equations that include an added term that passes the 5% significance test.

The (lagged) income variable is significant at the 1% level in each case. This result is clear evidence that migration flows respond to relative material wellbeing of countries (or to factors positively correlated with material wellbeing). Over each period we find also that the HPI Life Satisfaction measure (as modelled by Abdallah, 2008) adds further information over and above material wellbeing. Thus potential migrants respond positively to the factors within *LS-HPI* that are uncorrelated with either *log(GDP(pc))* or *log(GNI(pc))*. This series therefore captures significant non-income-related factors that affect individuals' revealed preference decisions to improve their life outcomes through migration. No other variable is significant in the equations related to Table 6.

The country fixed effects capture the impacts of migration restrictions and migration preferences (together represented by the fixed cost term, F^j, in equation (3)) that remain constant over time. However, migration restrictions and preferences may vary over time in response to changing economic and social circumstances of countries. To capture this possibility we extend the base equation to include three control variables that may themselves explain, or be correlated with, changes in migration restrictions and/or migration preferences within a country. The three variables are: $GDPgrowth_{it-1}$, $Eco\text{-}Glob_{it-1}$ and $Soc\text{-}Glob_{it-1}$.

The first of these variables is included on the basis that a country that has had recent strong GDP growth may relax its immigration restrictions owing to the requirements for a growing workforce. The Economic and Social Globalisation variables are measures of a country's integration with the global economy and society which, in turn, may be associated with its immigration policies. Neither variable includes migration flows directly, but the Social Globalisation measure includes the stock of migrants within a country. Migration studies show that new migrants tend to migrate to areas where there is already a stock of that country's migrants in residence. Thus the variable helps to pick up social factors, as well as migration policies, that affect the tendency of a country to attract migrants separate from wellbeing and sustainability factors. These three additional variables are included solely as control variables in an extended equation and so we do not interpret their coefficients.

Table 7 provides results for this extended specification for each of the two time periods. As for Table 6, all potentially included variables are again listed, and the equation that includes solely the income term (in addition to the unreported control variables and time and country fixed effects) is shown. Any equation that includes an added term that passes the 5% significance test is also shown. For the full period, the income term is again consistently significant as is the HPI-based life satisfaction measure (*LS-HPI*), each at the 1% level.

Over the shorter period, the income measure is again significant, but so too are three extra variables when included by themselves together with *log(GNI(pc))*. The first of these is *LS-HPI* as before. The second is the standard deviation in the WVS measure of life satisfaction (*LS-Sdev*), with its coefficient indicating that net inward migration flows are lower for countries with higher inequality of life satisfaction. Third, the ecological footprint variable (*EcoFprint*) is significant, but positive. Taken at face value, this result implies that potential migrants favour (re)location in countries that have an unsustainable economic structure (when viewed in ecological terms). As already shown, however, a country's ecological footprint has little or no relationship with its current environmental outcomes (i.e. with Yale's *EPI* measure). Instead, it may be the case that countries that are currently exploiting large resource endowments have positive short term economic prospects that attract migrants.

When the three additional variables are included together (column [5] in Table 7), *LS-HPI* remains significant (p=0.050), but neither *EcoFprint* (p=0.070) not *LS-Sdev* (p=0.665) is significant. When *LS-Sdev* is dropped from this extended equation, *EcoFprint* remains positive but is just insignificant (p=0.052) while *LS-HPI* remains significant (not shown in Table 4). Each of the equations that includes *LS-HPI* has a much higher Durbin-Watson (D.W.) statistic than do the equations that only have income as an explanatory variable, and there is no evidence of auto-correlation for the 1985-2010 equations that incorporate *LS-HPI*.

Overall, the results indicate a robust finding that the HPI-based life satisfaction measure, *LS-HPI* as modelled by Abdallah et al (2008), is significant across all specifications across both time periods. This result indicates that migrants respond to more than just material wellbeing, proxied by *log(GDP(pc))* or *log(GNI(pc))*. Thus non-income-related factors contributing to life satisfaction are important determinants of migration decisions. The results also unequivocally indicate that material wellbeing is a key determinant of migration decisions. The revealed preference actions of migrants therefore indicate that material wellbeing, and life satisfaction factors beyond those that are correlated with purely material outcomes, are both important factors for potential migrants seeking to improve their life outcomes.

5. Summary and Conclusions

Many measures of aggregate wellbeing and sustainability exist for multiple countries. These include measures of material wellbeing, surveyed wellbeing measures, composite wellbeing measures and ecologically-based sustainability measures. The alternative measures have greater or lesser degrees of theoretical underpinning and may have differing objectives from one another. A small number of objective indicators of wellbeing also exist including life expectancy. We argue that revealed preference indicators such as migration choices – where the choices are made so as to improve life outcomes now and into the future – are also objective indicators of wellbeing.

Most wellbeing and sustainability indicators are positively correlated with one another. Inequality measures are also correlated: countries that register higher wellbeing on most wellbeing indicators having lower inequality (both of life satisfaction and of incomes). One indicator that has a counter-intuitive relationship with others (based on ecological theory) is *EcoFprint*, the ecological footprint measure calculated by WWF. Countries with a high *EcoFprint* tend to have high measures of wellbeing according to other indices and, more surprisingly, have (on average) slightly higher scores for Yale's Environmental Performance Index, *EPI*, for contemporary environmental outcomes.

In examining one country, New Zealand, we find that alternative measures of wellbeing and sustainability can give substantively different indications of how well the country is faring. For instance, within the OECD, New Zealand fares poorly on material income measures, only moderately on life satisfaction measures (albeit highly on one happiness measure), and fares well on two composite measures of wellbeing. It performs moderately well on one environmental indicator (*EPI*) but not on the other (*EcoFprint*).

Given these diverse indications, we test the information content of a range of indicators for predicting migration outcomes over a fifty year time period for the 24 initial OECD countries. Each indicator must have sufficient coverage across countries and across time (at least 30 years) to be included in our tests. These tests deliver a strikingly consistent result across two separate time periods and across two alternative specifications. We find that both material wellbeing (*GDP(pc)* or *GNI(pc))* and life satisfaction (*LS-HPI* as modelled by Abdallah et al (2008) which is based, in turn, on life satisfaction survey results) are significant determinants of migration decisions. Thus a measure of material wellbeing such as GDP, while being an important predictor of migration, is an insufficient index for measuring aggregate wellbeing for potential migrants. A broader measure of life satisfaction (that includes a component that is uncorrelated with material wellbeing factors) must also be included in the definition of aggregate wellbeing for these individuals.

Our results provide empirical evidence for the observation that policy-makers face an explicit welfare trade-off in cases where a prospective policy increases per capita incomes but decreases some other facet(s) of life satisfaction. Where such a trade-off occurs, a typical economic impact report or monetary cost-benefit analysis (that does not monetise intangible values contributing to life satisfaction) will provide an insufficient yardstick to determine whether a policy should be adopted (Layard, 2011). A broader analysis that includes the value placed on general life satisfaction is required. Our results are consistent with the conventional wisdom that extra money (income) does improve wellbeing, but they also demonstrate that (per capita) incomes should not be the sole basis for assessing the merits of alternative public policies.

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7. Tables

Table 1: Cross-sectional Correlation Coefficients (Full sample. 2010 or most recent prior data)

	GNI(pc)	GDP(pc)	LifeExp	Fem/Male	HDI	EPI	EcoFprint	Eco-Glob	Soc-Glob	LS-HPI	OECD-BLI	LS-Mean	LS-Sdev	Gini
GNI(pc)	1													
GDP(pc)	0.91	1												
LifeExp	0.58	0.60	1											
Fem/Male	0.09	0.20	0.31	1										
HDI	0.71	0.73	0.90	0.33	1									
EPI	0.53	0.57	0.40	0.05	0.47	1								
EcoFprint	0.59	0.59	-0.02	-0.29	0.14	0.11	1							
Eco-Glob	0.67	0.71	0.56	0.23	0.69	0.49	0.31	1						
Soc-Glob	0.81	0.82	0.69	0.31	0.79	0.61	0.18	0.78	1					
LS-HPI	0.43	0.49	0.07	-0.68	0.19	0.39	0.42	0.49	0.44	1				
OECD-BLI	0.80	0.85	0.32	-0.54	0.44	0.65	0.52	0.35	0.66	0.71	1			
LS-Mean	0.33	0.39	0.36	-0.05	0.34	0.27	-0.22	0.37	0.41	0.14	0.28	1		
LS-Sdev	-0.43	-0.54	-0.27	-0.02	-0.25	-0.35	0.17	-0.32	-0.43	-0.37	-0.49	-0.58	1	
Gini	-0.38	-0.38	-0.23	-0.17	-0.26	-0.22	-0.19	-0.32	-0.40	-0.31	-0.47	0.05	0.15	1

GNI(pc) is gross national income per capita in PPP terms, current dollars (source: World Bank).
GDP(pc) is gross domestic product per capita in PPP terms, 1990 US dollars (source: Maddison, 2006).
LifeExp is average of female and male life expectancy at birth (source: World Bank).
Fem/Male is ratio of female to male life expectancy at birth (source: World Bank).
HDI is the Human Development Index, updated definition (source: UNDP).
EPI is the Environmental Performance Index (source: Yale Center for Environmental Law and Policy, Yale University).
EcoFprint is Ecological Footprint used by New Economics Foundation (NEF) for Happy Planet Index, version 1 (source: WWF).
Eco-Glob is the Economic Globalisation index (source: Dreher (2006), updated in Dreher et al (2008)).
Soc-Glob is the Social Globalisation index (source: Dreher (2006), updated in Dreher et al (2008).
OECD-BLI is OECD's (equal-weighted) Better Life Index (source: OECD).
LS-HPI is Life Satisfaction modelled by Abdallah et al (2008) for the NEF Happy Planet Index, version 1 (source: NEF).
LS-Mean is the mean life satisfaction score from the World Values Survey (source: WVS).
LS-Sdev is the standard deviation of life satisfaction (source: WVS).
Gini is the Gini coefficient of income inequality (source: CIA Factbook; and OECD).
GDPgrowth is the growth rate of GDP(pc) over the most recent decade (not included in Table 1).

Table 2: Panel Correlation Coefficients (OECD24. Bottom left: 1960–2005; top right: 1980–2005)

	log(GDP)*	LifeExp	Fem/Male	EcoFprint	LS-HPI	LS-Mean	LS-Sdev	Gini	HDI
log(GDP)*	-	0.80	-0.10	0.41	0.50	0.22	-0.64	-0.22	0.81
LifeExp	0.84	-	-0.24	-0.04	0.09	0.13	-0.47	0.10	0.73
Fem/Male	0.05	-0.16	-	-0.06	-0.19	-0.02	0.04	-0.11	-0.25
EcoFprint	0.45	0.20	0.08	-	0.52	-0.27	-0.04	-0.21	0.25
LS-HPI	0.54	0.33	-0.05	0.52	-	0.24	-0.40	-0.56	0.38
LS-Mean	n.a	n.a	n.a	n.a	n.a	-	-0.29	0.01	0.13
LS-Sdev	n.a	n.a	n.a	n.a	n.a	n.a	-	0.29	-0.41
Gini	n.a	n.a	n.a	n.a	n.a	n.a	n.a	-	-0.07
HDI	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	-

**Per capita. |r|> 0.16 is significant at the 1% level (full sample).*
Variables are defined below Table 1.

Table 3: New Zealand Indicator Rankings (full sample and 24 OECD countries)

Indicator	Full Sample Ranking	Full Sample Percentile	OECD 24 Country Ranking	OECD 24 Country Percentile
GNI(pc)	28 / 182	15	22 / 24	92
GDP(pc)	25 / 189	13	19 / 21	90
LifeExp	19 / 193	10	12 / 24	50
Fem/Male	132 / 194	68	21 / 24	88
HDI	5 / 187	3	5 / 24	21
EPI	14 / 131	11	11 / 24	46
EcoFprint	22 / 25	88	20 / 23	87
Eco-Glob	21 / 144	15	10 / 24	42
Soc-Glob	30 / 198	15	20 / 24	83
LS-HPI	9 / 25	36	9 / 23	39
OECD-BLI	4 / 33	12	4 / 23	17
LS-Mean	48 / 94	51	18 / 24	75
LS-Sdev	65 / 94	69	22 / 24	92
Gini	51 / 135	38	21 / 24	88

A low ranking and a low percentile implies a comparatively high level of wellbeing.

Variables are defined below Table 1.

Table 4: New Zealand's Absolute Rankings (within OECD24)

	1960	1980	2005
log(GDP(pc))	3/22	17/22	18/22
log(GNI(pc))	-	18/24	22/24
LifeExp	9/24	18/24	11/24
Fem/Male	14/24	19/24	23/24
EcoFprint	23/23	16/23	20/23
LS-HPI	15/23	15/23	9/23
LS-Mean	-	21/24	20/24
LS-Sdev	-	24/24	22/24
Gini	-	10/23	20/23
HDI	-	5/23	4/24

A low absolute ranking implies a comparatively high level of wellbeing.
Variables are defined below Table 1.

Table 5: New Zealand's Percentile Rankings (within OECD24)

	1960	1980	2005
log(GDP(pc))	14	77	82
log(GNI(pc))	-	75	92
LifeExp	38	75	46
Fem/Male	58	79	96
EcoFprint	100	70	87
LS-HPI	65	65	39
LS-Mean	-	88	83
LS-Sdev	-	100	92
Gini	-	43	87
HDI	-	22	17

A low percentile ranking implies a comparatively high level of wellbeing.
Variables are defined below Table 1.

Table 6: OECD24 Equations for Net migration(t)/population(t-1)

	[1]	[2]	[1]	[2]
Explanatory variables (t-1)	*1965-2010*		*1985-2010*	
log(GDP(pc))	0.0408**	0.0336**		
log(GNI(pc))˃			0.0386**	0.0495**
GDPgrowth				
LifeExp				
Fem/Male				
EcoFprint				
LS-HPI		0.0096**		0.0245**
LS-Mean˃				
LS-Sdev˃				
Gini˃				
HDI˃				
Eco-Glob˃				
Soc-Glob˃				
Countries	22	21	24	23
Observations	220	210	144	138
R^2	0.5150	0.5215	0.6116	0.6580
s.e.e.	0.0132	0.0132	0.0117	0.0110
D.W.	1.50	1.52	1.70	1.89

Variables are defined below Table 1.
˃ *Indicates that this explanatory variable is available only for the 1985–2010 analysis.*
Coefficient significant at 1% (**), 5% (*).
Dependent variable (22 country) mean: 1965–2010 = 0.0099; standard deviation = 0.0175.
Dependent variable (24 country) mean: 1985–2010 = 0.0148; standard deviation = 0.0168.
s.e.e. is the equation standard error.
D.W. is the Durbin-Watson test for auto-correlation.
Equation shown only if added variable is significant at 5% given the inclusion of log(GDP(pc)) or log(GNI(pc)).
All equations include (unreported) constant term, country fixed effects and period fixed effects.

Table 7: OECD24 Equations for Net migration(t)/population(t-1) with added controls

	[1]	[2]	[1]	[2]	[3]	[4]	[5]
	1965-2010		1985-2010				
log(GDP(pc))	0.0406**	0.0313**					
log(GNIpc))>			0.0277*	0.0515**	0.0386*	0.0304*	0.0440**
LifeExp							
Fem/Male							
EcoFprint				0.0044*			0.0034
LS-HPI		0.0122**			0.0208*		0.0164*
LS-Mean>							
LS-Sdev>						-0.0251*	-0.0060
Gini>							
HDI>							
Countries	22	21	22	21	21	22	21
Observations	220	210	132	126	126	132	126
R^2	0.5216	0.5383	0.5781	0.6103	0.6125	0.5942	0.6285
s.e.e.	0.0131	0.0130	0.0111	0.0107	0.0107	0.0110	0.0106
D.W.	1.53	1.59	1.65	1.85	1.81	1.76	1.90

Variables are defined below Table 1.
> Indicates that this explanatory variable is available only for the 1985–2010 analysis.
Coefficient significant at 1% (**), 5% (*).
Dependent variable (22 country) mean: 1965-2010 = 0.0099; standard deviation = 0.0175.
Dependent variable (22 country) mean: 1985-2010 = 0.0137; standard deviation = 0.0150.
s.e.e. is the equation standard error.
D.W. is the Durbin-Watson test for auto-correlation.
Equation shown only if added variable is significant at 5% given the inclusion of log(GDP(pc)) or log(GNI(pc)).
All equations include (unreported) constant term, country fixed effects, period fixed effects.
1965–2010 equations also include lagged GDP growth.
1985–2010 equations also include lagged GDP growth, lagged economic globalisation and lagged social globalisation index.

8. Figures

Figure 1: GNI (per capita) and GDP (per capita)

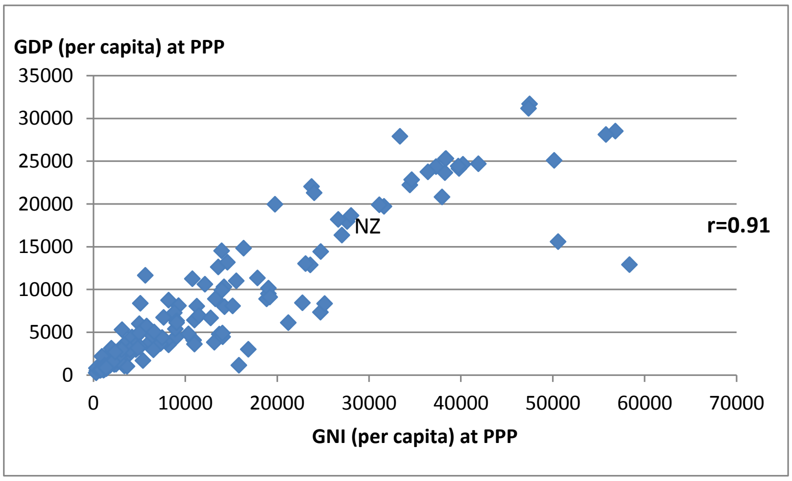


Figure 2: GNI (per capita) and Life Expectancy

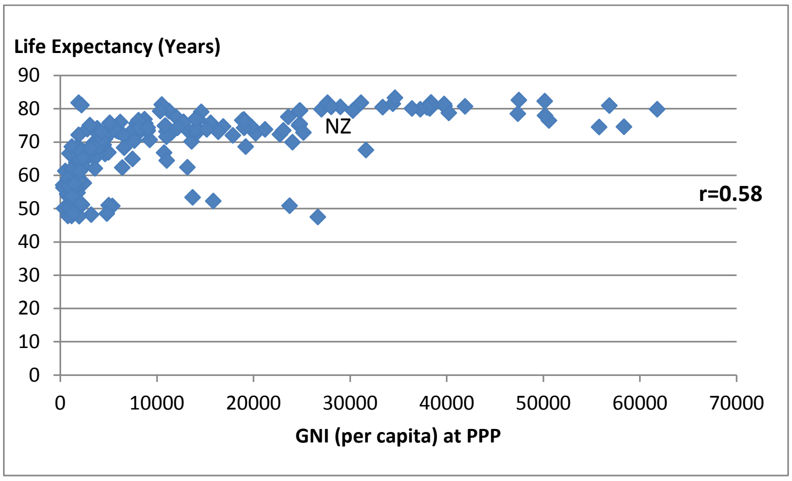


Figure 3: GNI (per capita) and Female/Male Life Expectancy Ratio

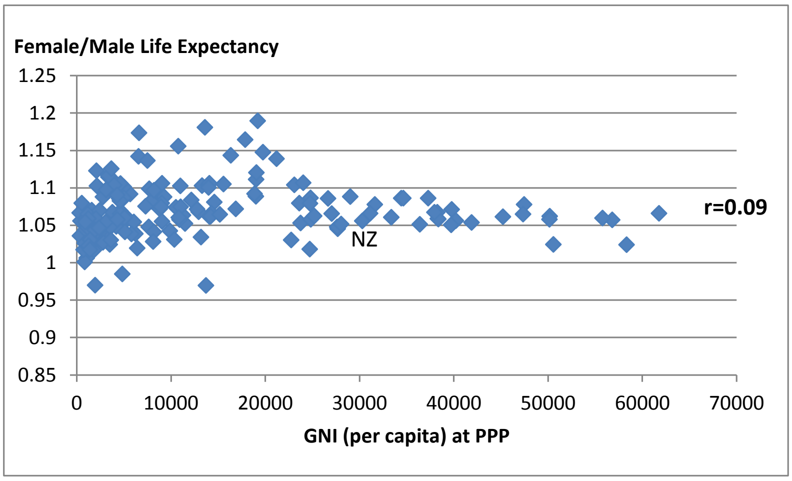


Figure 4: GNI (per capita) and Economic Globalisation

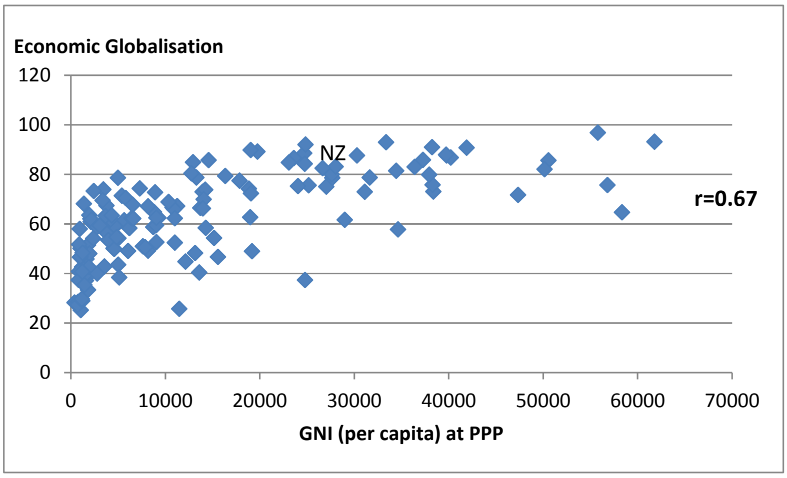


Figure 5: GNI (per capita) and Social Globalisation

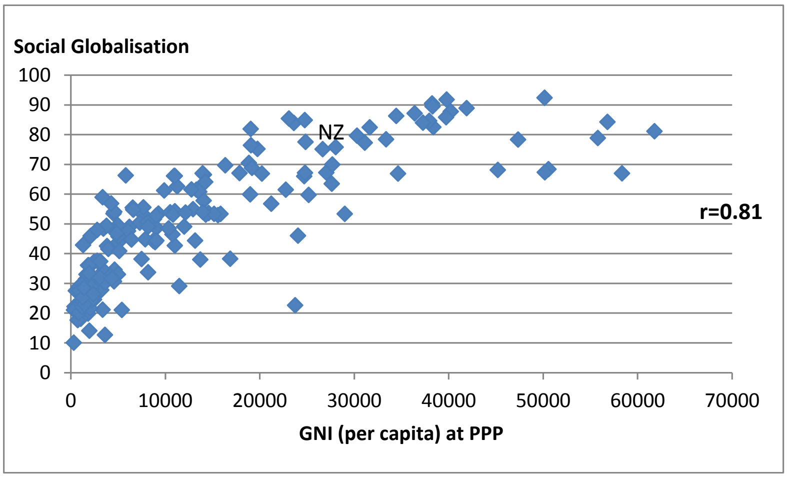


Figure 6: GNI (per capita) and Life Satisfaction (HPI)

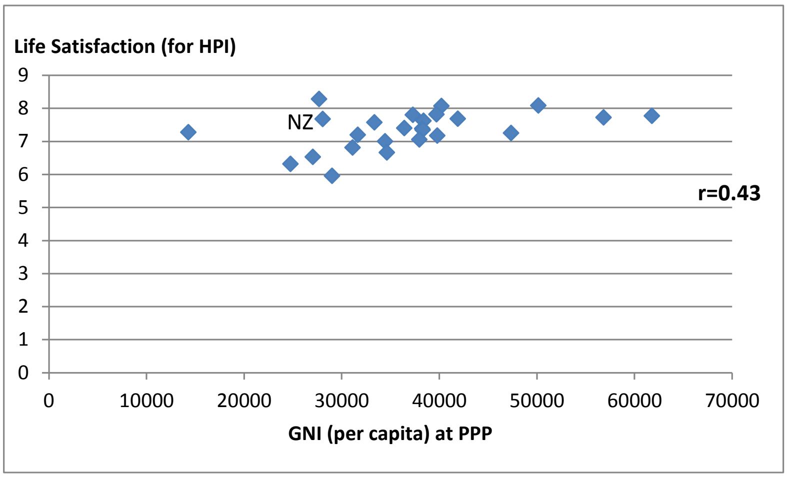


Figure 7: GNI (per capita) and Life Satisfaction, mean (WVS)

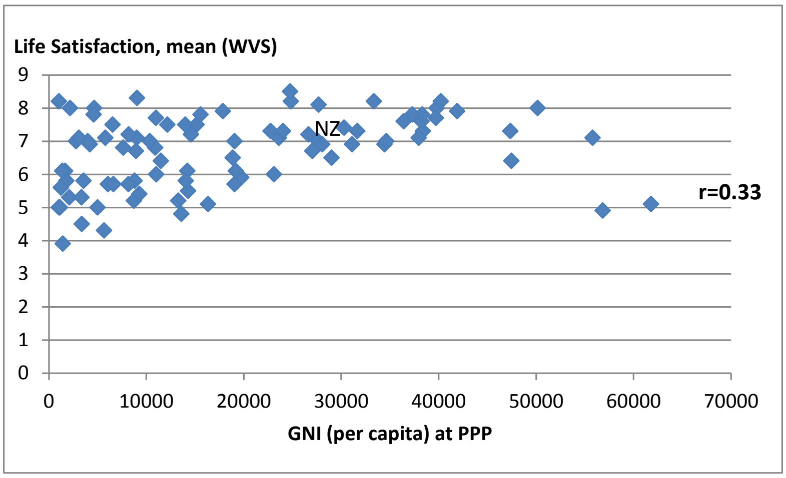


Figure 8: GNI (per capita) and Life Satisfaction, standard deviation (WVS)

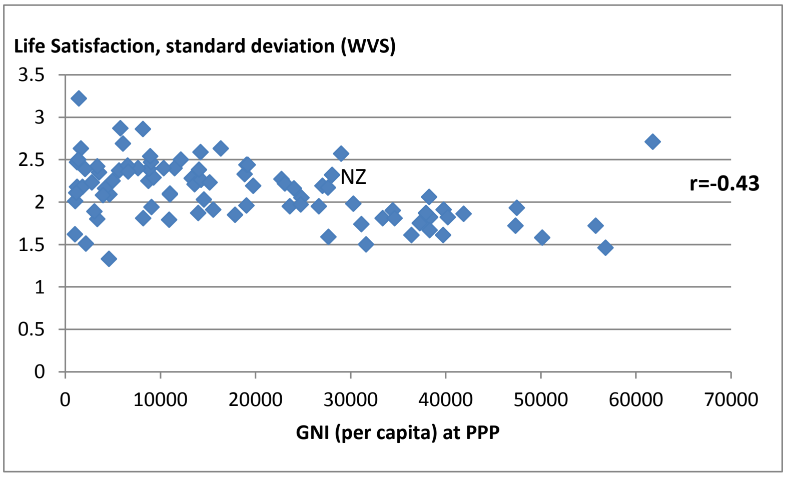


Figure 9: GNI (per capita) and Gini Coefficient

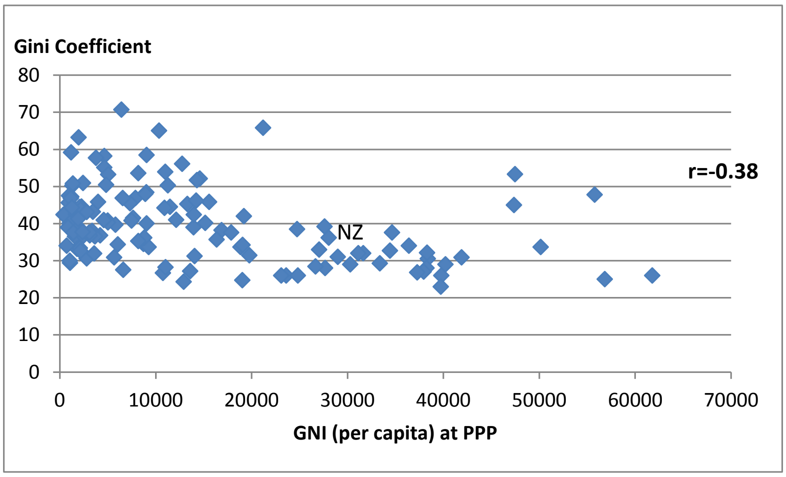


Figure 10: GNI (per capita) and UNDP Human Development Index

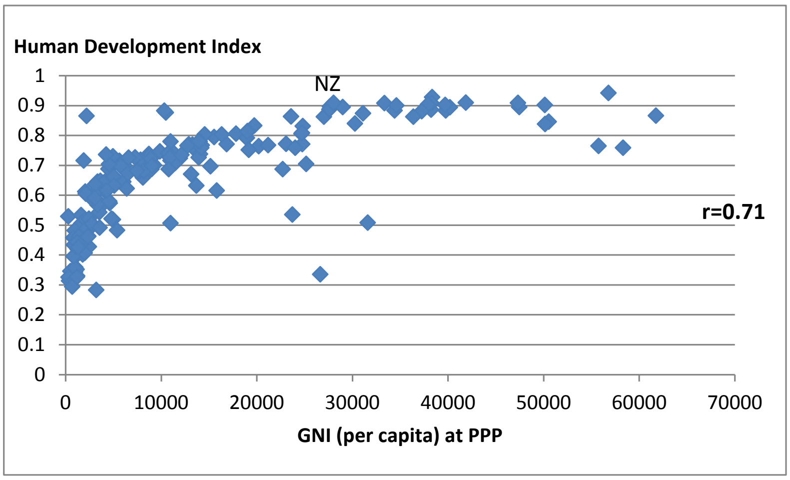


Figure 11: GNI (per capita) and OECD Better Life Index

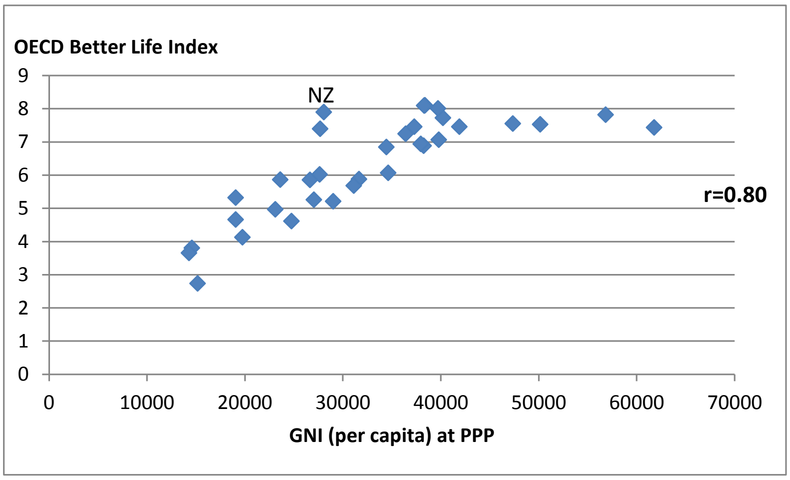


Figure 12: GNI (per capita) and Ecological Footprint

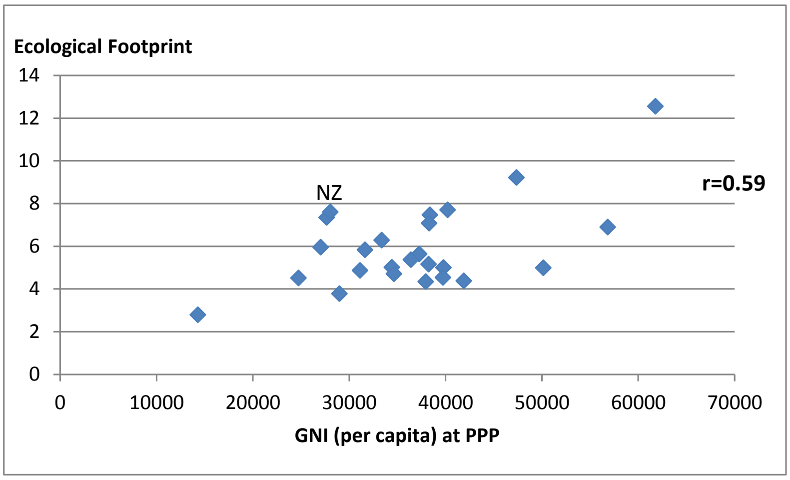


Figure 13: GNI (per capita) and Yale Environmental Performance Indicator

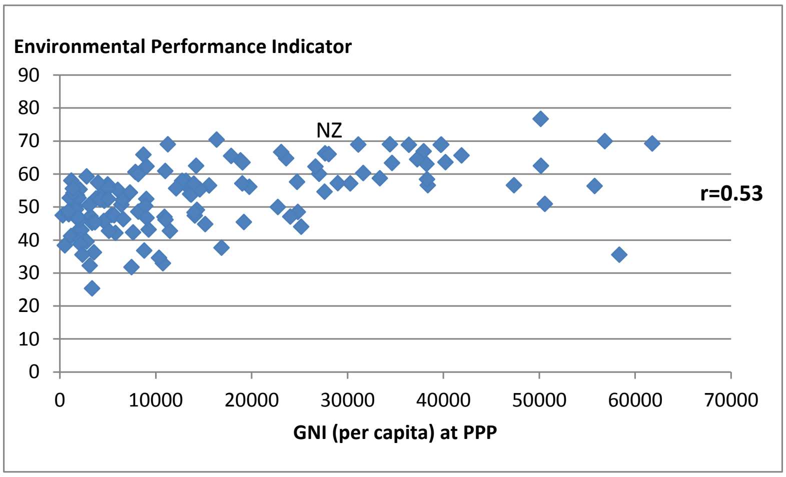


Figure 14: Environmental Performance Indicator and Ecological Footprint

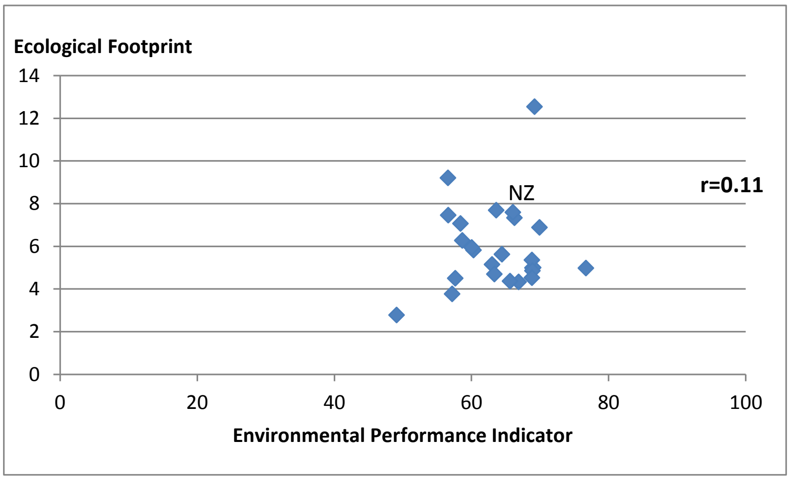
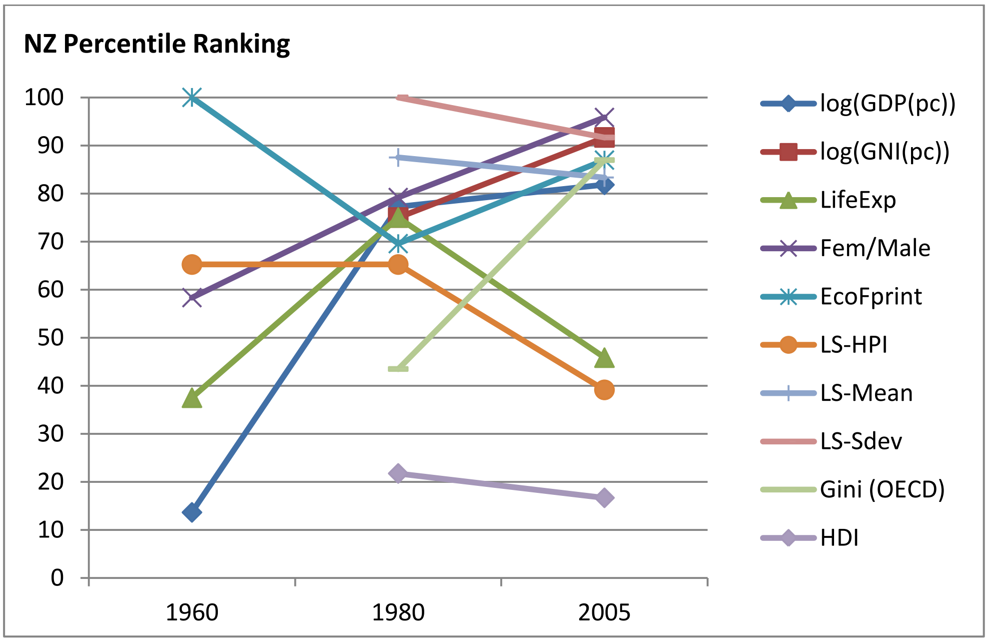


Figure 15: New Zealand's Percentile Rankings (within OECD24)



A low percentile ranking implies a comparatively high level of wellbeing.

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