

Towards a global index of shared prosperity: a case study on New Zealand

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Abstract

Global prosperity has been rising over the last decade, along with public debate about growing inequality and its potentially negative social and economic consequences. The purpose of our research is to create an annually updated composite index, The Shared Prosperity Index (SPI), to quantify and visualise how effectively prosperity has been shared in New Zealand over time as well as near-future predictions. Past measures of inequality have tended to focus on a single factor such as income distribution, but in recent years a number of composite indices have emerged internationally which have attempted to provide a multi-dimensional perspective regarding prosperity and collective wellbeing. The SPI is differentiated from the existing measures by emphasising the idea of shared rather than absolute prosperity and employing a particular focus on the New Zealand context. The SPI employs eight multivariate dimensions identified as drivers of shared prosperity: income and wealth, employment, housing, health, socio-economic wellbeing, education, safety and security, and general equality, and incorporates national and international data sources to compute a composite index. The SPI begins in 1982, and results show that the level of sharing from then reached a peak in New Zealand during the early to mid-1980s, before dropping sharply between 1987 and 1994, coinciding with cuts to government services and a move to a more open and less-regulated economy. Shared prosperity began slowly rising again until 2007 when it flattened out and trended downwards. In terms of eight individual SPI dimensions, we find most indices, while displaying some variability, reflect an overall decrease in sharing over their respective time-spans. The largest drop is in the Income and Wealth index, consistent with international findings on the growing gap between the rich and poor. The indices for two dimensions, Safety and Security and Education, have increased over their time-spans, although the Education index appears to be trending down.

Keywords: Inequality, Prosperity, Wellbeing, Indices

1. Introduction

Inequality is not a new phenomenon. Significant disparities in wealth and income are not a unique characteristic of the Western economic system. In fact, gross inequality has been a consistent feature of all historic societies which attained means of generating surplus production and material wellbeing beyond subsistence levels [1]. However, an increasing public discourse has emerged with a critical focus on whether or not the current economic system still delivers sufficient benefits for everyone.

Even the IMF now argues that extreme inequality presents dangers to the continuing growth of economies and their long-term stability. Research by Brueckner [2] suggests that higher inequality raises per capita Gross Domestic Product (GDP) in low-income countries, but has the opposite effect in countries with middle or high incomes. Meanwhile, and not without its critics, a large body of literature [3] exists which implicates growing inequality with a plethora of social ills and dysfunctions over a wide range of outcomes. Chief amongst these, more unequal societies tend to be more violent [4] and have higher rates of imprisonment [5]; they tend to be less healthy [6, 7, 8, 9] and experience higher rates of mental illness [10, 11, 12]. Such societies experience increased rates of addiction [13] and substance abuse [14], worsening education systems [5] and reduced social cohesion [15, 16]. Additionally, equality of opportunity erodes with high levels of inequality and social mobility ossifies [17, 18]. The collateral social damage associated with uneven economic growth within a soci-

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ety may be significant enough to question if, on balance, it is acceptable or even sustainable.

Irrespective of whether or not causal relationships between increasing inequality and various social dysfunctions have been conclusively demonstrated, a strong case exists for at least creating richer and more meaningful measures for quantifying this phenomenon than currently exist. In the past, and mostly due to a paucity of data, measuring inequality has usually focussed solely on income disparities, using a single index like the Gini coefficient. For a developed welfare state like New Zealand, such measures are inadequate, as they convey only one aspect of inequality. One-dimensional indicators such as this fail to take into account the *final income* that citizens receive, which is comprised of in-kind services such as education, health-care, security, housing, as well as state-funded income assistance. Given the multidimensional nature of final income, it is first necessary to more holistically quantify shared prosperity, before the severity of inequality can be assessed, including trends over time as well as likely near-future trajectories. Only once this has been achieved can we look at proposed solutions to this challenge which may inform policy recommendations.

1.1. Purpose

It is well accepted that GDP is an incomplete and inadequate measure of how well different segments of society benefit from an expansion in economic activity. GDP delivers important information, but it falls short of conveying the full story of a nation's collective welfare⁹. With this in mind, a large number of composite indices have emerged over the last two decades, which have attempted to fill in the missing narrative. Measures and indices such as the OECD Better Life Index, UNDP's Human Development Index, and the Legatum Prosperity Index have all contributed to the construction of a richer perspective on what constitutes national wellbeing. They have all fundamentally been internationally focused, which comes with advantages and disadvantages. While international comparability and benchmarking become possible, this can only be ensured if the underlying data and indicators are very general, and thus the final indices are produced at a cost of sacrificing measurements that are specific and relevant to individual countries. To that end, the New Zealand Treasury has initiated a project to develop an alternative Wellbeing Framework or Index that is broad as well as tailored

to the New Zealand context, which international measures are unable to provide.

The purpose of this research was to create an annually updated composite index that is focused on the New Zealand context and challenges, and one which has a clearly differentiating feature from existing measures through an intentional emphasis on the idea of shared prosperity, manifestations of inequality, and negative effects associated with steep socio-economic gradients. For key measures such as GDP, well accepted macro-economic theory exists for defining optimal levels of GDP growth for various economies. No such theories exist in the context of income inequality. The New Zealand Treasury has stated that there is no definable 'right' level of inequality. By broadening the concept of final income and shared prosperity more generally, in the long-term this project may define levels of inequality that society should aim at.

The goal of this project is to shed light on trends in the evolution of inequality in the New Zealand context and for it to serve as a resource for informing government policy and public discourse over time. Additionally, this research strives to create a platform for further work regarding the causes of inequality as well as policy recommendations for addressing its growth and alleviating its argued negative societal effects. Transparency of our index values will be central to this project, enabling researchers to replicate our findings and modify these if required.

This paper describes the conceptual framework for the Shared Prosperity Index (SPI) and documents the underlying methodology of the research effort to create a SPI for New Zealand.

1.2. Background

The observation that the creation of prosperity without just distribution is morally questionable and economically sub-optimal encouraged us to create a measure that quantifies and visualises sharing of prosperity. As accurately quantifying any complex social phenomenon can rarely be satisfactorily achieved using a single number, we started by identifying dimensions that would capture the different economic and social aspects of prosperity. We agreed on eight dimensions: income and wealth, employment, housing, health, socio-economic wellbeing, education, safety and security, and general equality. The choice of dimensions was guided by our understanding of what a prosperous society would look like. In a broad sense, prosperity refers to a gain in something favourable or desirable. In the context of a society, this means that people can meet basic, psychological and self-fulfillment needs. Section 2

⁹See e.g. the work by Mumford (2016) on prosperity and the measurement of wealth [19]

outlines how these dimensions are interpreted in a New Zealand context.

1.3. Quantifying Inequality

In an economics context, the Gini coefficient is the most commonly used measurement of inequality. It is a basic measure of statistical dispersion that quantifies the income or wealth distribution of a nation's population. The other commonly used economic measure of inequality is the computation of wealth distribution. It is then possible to compare, for example, the wealth of individuals at the 99th percentile to the wealth of the median. Both measures are one-dimensional, focusing on direct monetary values only (income, assets and liabilities). While simple measures are useful for an initial assessment of economic inequality, they are insufficient for measuring prosperity inequalities.

1.4. Composite Indices

Composite indices are useful to measure complex and multi-dimensional issues by combining a variety of individual components. In doing so, they provide a 'big picture' which is often easier to interpret than looking for common trends in several individual scores. Composite indices, however, are not without weaknesses. The index could send a misleading message if movement is driven by substantial changes in one of the components. It is therefore imperative to look at individual component movements when interpreting the findings of the overall index.

In recent years, several composite indices have been created to quantify the idea of prosperity and wellbeing. The OECD Better Life Index, for example, measures wellbeing across countries, based on 11 topics the OECD has identified as important and essential, not only in the areas of material living conditions but also in quality of life. The Legatum Prosperity Index measures how prosperity is forming and changing across the world. The index provides cross-country comparisons and rankings of overall prosperity based on its nine different pillars. The Human Development Index (HDI) uses three dimensions (life expectancy, education, and per capita income) to rank countries into four tiers of human development.

A measure related to our SPI is the Living Standard Framework that was recently released by the New Zealand Treasury. This framework is New Zealand-focused and measures and tracks wellbeing based on four indicators of future wellbeing (natural capital, social capital, human capital, and financial and physical) and 12 domains.

The SPI differs from these other indices as it captures distribution rather than an absolute value of prosperity. Each of our dimensions consists of a variety of variables that measure levels of inequality and its potential negative effects. As such, our index should be used as a complement, rather than a substitute, to existing measures. Furthermore, our index focuses on New Zealand only. While the overall conceptual framework and methodology could easily be used for different countries, individual variables might need to be changed to capture the uniqueness of a country's understanding of prosperity.

2. Conceptual Framework

The SPI embodies a belief that a prosperous society is one where everyone has the opportunity to take part and share in the generated wealth and benefits of a complex economy. However, SPI does not view prosperity as solely a reflection of material wealth. SPI conceptualises prosperity as also being able to access subsidised healthcare and education, affordable housing as well as employment opportunities that provide a platform for citizens to flourish and realise their ambitions. Importantly, a sense of prosperity is diminished in the presence of high rates of violent crime as well as expanding prison populations.

Social mobility and a sense of possessing the ability to realise personal aspirations is the cornerstone of an economy that shares prosperity effectively. In the absence of such hope, and in the presence of extreme inequalities, the proclivity for discontentment, sense of unfairness and resentment increases with potential negative social consequences, which the SPI seeks also to quantify as a measure of overall prosperity.

The following provides an overview of the eight dimensions that make up the SPI.

2.1. Income and Wealth

Income enables the consumption of a range of goods and services ranging from basic necessities to luxury items. Aggregate income at the country level determines the resources that are available for procuring social services such as health-care and education, either directly via private purchases or indirectly via taxpayer-funded social services provided by the government.

It is not only the level of income that is important, but also how it is distributed. Commonly cited measures such as GDP per capita is useful as an indication of the level of resources available to residents of a country *on average*, but it is silent on the important question of how those resources are shared. To address these questions

we turn to measures of income inequality, such as the Gini coefficient or the average income available to those towards the bottom of the income distribution.

While income measures the flow of resources over an interval of time (for instance, annual income in dollars), wealth measures the total stock of resources at a point in time (for instance, net worth in dollars today). Thus wealth is an indication of the resources already accumulated by an individual, group or country and income is a measure of additional resources that have been acquired over a period of time and have not been spent. The difference between income and spending - that is, savings - explains the change in wealth from one point in time to the next.

It is important to point out that income and wealth do not encompass everything that is valued. Many people value a healthy environment, but it would not be classed as income or wealth. Likewise, family, friends and other networks can be viewed as a form of social capital, but are not reflected in dollar wealth.

What makes income and wealth distinct from other endowments, such as a clean environment, a strong social network or a well-functioning political system, is the ability to convert it (via cash) into a myriad of goods or services. Thus income empowers individuals to choose for themselves which goods or services they wish to consume. See A.2 for a full description of variables of this dimension.

2.2. *Socio-economic Wellbeing*

The definitions of poverty usually relate to a function of median income. For example, poverty is often defined as those households with an income below 50% or 60% of the median income, indicating a low share of financial prosperity. We provide data on poverty as income below 50% of an anchored line median. For the anchored line median, the low-income threshold is kept constant (at the 2007 level) in real terms. Over time this measure will indicate whether income has improved in real terms, rather than in relation to the average household. We also explore poverty in different segments of the population. We might expect that in a society where prosperity is less well shared, potentially vulnerable segments, such as the elderly, single parents and children, may be impacted to a greater extent. Poverty risk ratio is the ratio of the percentage of poverty in a subgroup to the percentage of poverty in the entire population. As this ratio increases, the risk of poverty for the subgroup increases. The data is presented after housing costs are taken into account. The after-housing costs measure allows for the significant impact of housing costs on the likelihood that someone

will experience poverty. For instance, a household may have low income, but if housing costs are low, perhaps due to debt-free home ownership or free accommodation, the members of that household may have more discretionary income than someone paying rent to accommodate a large family. See A.3 for a full description of variables of this dimension.

2.3. *Health*

Many factors indicate health-related prosperity and therefore we have incorporated several variables within our model.

It is important to distinguish between adult health and child-related health. Therefore, our model includes separate health indices for adults and children. Child health is particularly significant, as not only do children represent future citizens, workers and taxpayers, but failing to address health deficits at a young age results in adults who are plagued by ill-health and lowered resistance.

Obesogenic environments are a consequence of income inequality [9]. We have included various measures associated with poor diet including fruit and vegetable intake, eating breakfast, and body weight. Although there are several lifestyle diseases associated with inequality we have chosen to focus on diabetes due to alarming increases in this disease, and the higher prevalence of diabetes in low-income groups in western populations [20].

Mental health contributes to overall health and wellbeing [10]. We include data on negative aspects of mental health including anxiety, depression and suicide rates. Furthermore, we have included the percent of the population who are seeking help for problem gambling, as adults experiencing gambling-related harm come from areas of greater deprivation and have lower income [13]. See A.4 for a full description of variables of this dimension.

2.4. *Education*

Education is an important variable when addressing the fairness of society, both as an explanatory factor and as an outcome. First, it is a measurable reflection of the distribution of opportunities for individuals. Education is a necessary instrument for navigating the contemporary world, and all people have a right to access this; it is not a 'luxury item' for only a privileged few. Education is also a good thing in itself for those who desire it, and so directly contributes to their wellbeing. Second, availability of education is an important method of removing barriers to equitable outcomes of other kinds, such as improving health and reducing crime rates [21],

and this effect can persist into later generations [22]. It can also be a means to social mobility, making future prospects less tethered to an individual's initial or current situation. For example, education can be a means to employment, and can offer more desirable employment opportunities, although this interacts with other social features in potentially complex ways [23].

For this reason, we have focused on access to education in our measurement: the financial burden of tertiary education on those receiving the education, the efforts of the government to defray this burden, and the improvement in employment prospects that this education offers. Education, of course, broadens an individual's horizons in ways not merely related to financial gains, but these aspects are not easily quantifiable (or at least are not currently measured), and so cannot be included in the index at this stage. See A.5 for a full description of variables of this dimension.

2.5. Employment

Given the impact employment levels have on economic performance and personal wellbeing, the employment dimension is an important component of the SPI. High levels of employment are linked to economic growth and prosperity, while large employment inequalities slow down economic activity. In a comprehensive study, Aghion, Caroli and Garcia-Penalosa [24] find that wage inequalities have a negative impact on growth and that higher growth does not reduce wage inequalities.

The employment dimension looks at two aspects of work: 1) how many people are unable to participate in the creation of prosperity because they are unable to find employment and 2) do people in employment receive a fair share of the wealth created by the workforce.

To capture the first aspect, the employment dimension includes the unemployment rate, the underemployment rate, the long-term unemployment rate and the percentage of youth who are not employed or in training. To see if older workers who are interested in employment are still considered part of the workforce, we have included the unemployment rate for the age groups 60-64 and 65+.

To capture the second aspect, we include the percentage of employees who work long hours as well as the percentage of the workforce on low pay (OECD definition and minimum wage) in the SPI. We also measure the labour share of income as well as the ratio of labour productivity and real product wages. This provides insights into the distribution of wealth created by the workforce.

Given the importance of employment for welfare, we also measure labour market insecurity. Living in fear of

losing your job or high penalties for changing a current position negatively impacts a person's wellbeing. See A.6 for a full description of variables of this dimension.

2.6. Housing

Housing ranks alongside nutrition and security as a basic human need. Not only does housing provide shelter from the elements, but it also provides the environment in which a large part of our daily social life plays out. The quality, availability and affordability of housing therefore directly impacts quality of life.

The cost of housing relative to income is comparatively high in New Zealand, particularly in the large metropolis of Auckland, but also to a lesser extent in other cities. This means that many people may struggle to afford accommodation close to employment opportunities, which tend to be clustered around the large metropolitan areas.

The cost of housing has been a high-profile political issue for some time, with commentators pointing to various combinations of strong demand, high construction costs and a limited supply of land zoned for urban development as causative factors. See A.7 for a full description of variables of this dimension.

2.7. Safety and Security

The terms 'safety' and 'security' refer to the degree to which we are free from harm and external hazards. Threats to safety and security include, but are not limited to, crime, terrorism, political instability, economic upheavals and cyber-attacks.

New Zealand is geographically isolated, has a stable, and non-corrupt democracy [25], a functioning market economy and is relatively peaceful [26]. These factors underpin New Zealand's relatively benign safety and security environment.

In terms of how safety and security relate to shared prosperity, links have been made between inequality and violent crime, in particular, homicide [4, 15, 27]. There is also a link between inequality and rates of imprisonment [5].

In New Zealand, relatively consistent and objective measures of crime and imprisonment are available and the SPI includes five of them: the remand, sentenced and post-sentence populations, the incidence of crime victimisation, and the rate of murders and homicides.

Links have also been made between inequality and domestic terrorism [28]. In New Zealand, a national terrorism threat level is determined by the Combined Threat Assessment Group and is constantly assessed.

The terrorism threat level is subject to frequent change, and historical data on the threat level is not

readily available. For these reasons the terrorism threat level is not included in the index, however this may be reviewed in the future. See A.8 for a full description of variables of this dimension.

2.8. General Equality

Although we have avoided ‘theory-first’ distinctions in our data sets as much as possible, there are remaining equality questions of particular interest from a New Zealand perspective, which are not specifically addressed by the other variables. We include these categories here for two separate, although related purposes. First, there are groups that have historically been in unequal economic situations in comparison with more privileged groups, and so these ought to be measured and addressed. Second, if we continue to fail to address these known, historical inequalities, this will be an indicator of failure to progress towards a fairer society.

For these reasons, a general measure of equality and prosperity should include measures of: the relative financial situation of Māori; the relative financial situation of women; the relative financial situation of long-term migrants, and the relative financial situation of those who do not own the house they live in. Additionally, given concerns regarding financial pressure in the regions, especially in comparison to the major cities, we have included an assessment of the regional variation in GDP. See A.9 for a full description of variables of this dimension.

3. Methodology

The research group tasked with developing the SPI comprised eight academics from different disciplines, who collectively represented a broad range of expertise as well as a diversity of viewpoints. The group met regularly over a period of one year in an iterative process which first involved formulating a framework regarding what constitutes shared prosperity, while considering economic and philosophical theories regarding what might be considered acceptable or optimal in terms of income distributions. Closely adhering to the guidelines specified in the OECD Handbook on Constructing Composite Indicators [29], data collection involving 150 indicators was carried out. These indicators were individually analysed by the group and reduced through consensus to 109. The complete list of indicators can be seen in the Appendix.

3.1. Indicator Selection Criteria and Data Sources

Indicator selection was driven by requirements that they be 1) conceptually *relevant* with respect to the assigned dimension and overall SPI framework, 2) supported by the body of *literature*, including practitioner literature, 3) *contribute* to illuminating otherwise neglected aspects of a given dimension, 4) possess a high degree of *quality* expressed in terms of frequency of measurement, historic data coverage and accuracy in quantifying the particular phenomenon of interest. The aim was to include objective data as well as data that captured subjective elements.

The decisions on inclusion were also heavily influenced by the reliability of the data sources and methods used for data collection. The existence and access to historic values of an indicator and the dependability of its continued collection into the future were key consideration criteria. The ongoing timeliness in the reporting and availability of the indicators was an important criterion, with one year after the end of the target calendar year being a guiding threshold for inclusion. Credibility of the data sources was of paramount importance in the indicator-inclusion decision making. The key data sources include:

- Ministry of Social Development
- Ministry of Education
- Ministry of Health
- Department of Corrections
- NZ Police
- Reserve Bank of NZ
- Statistics NZ
- OECD
- WHO
- Housing Corporation NZ
- Ministry of Business, Innovation and Enterprise
- Productivity Commission
- Coroner’s Office
- Interest.co.nz

Indicator Values

All indicator values are quantitative. The majority of the variables are in the form of percentages and ratios. A smaller proportion of indicators measure the spread of a quantity such as the degree of difference in GDP rates across different regions of New Zealand. In those instances, the proportional variability was used instead

of the standard deviation due to the non-normality of the indicators [30]. Custom measures such as the Gini coefficient were used for quantifying the inequality of incomes, while the house affordability measure (HAM) was used to determine the accessibility of the housing market. In two cases, incidences of phenomena were reported at per 100,000 and 1 million of the population - suicides and murders/homicides, respectively.

The indicator variables can be divided into two groups: objective and subjective values; as well as those which measure the *degree* of inequality and, others which capture the possible *effects*¹⁰ of inequality. The combination of both the objective and subjective indicators provides the SPI with a more holistic view of inequality. The objective indicators comprise ‘hard’ data which can be traced and validated. Examples of these are annual health expenditure as a percent of GDP, percentage share of all wealth by the top 1% or the unemployment rate. These indicators are captured from a variety of sources, but most commonly they originate with governmental institutions as well as large-scale nationwide surveys conducted by those institutions.

The subjective indicators complete the story by incorporating people’s perceptions of their material well-being as well as health status. Examples of these indicators are the percentage of people who perceive the adequacy of their income to be not enough or just enough to meet everyday needs, and the percentage of parents rating their child’s health as ranging from good to excellent. The data obtained for these indicators originates from large-scale self-assessment surveys conducted by Statistics NZ and the Ministry of Health.

Indicators can also be divided between those that capture the prevailing levels of inequality and those which measure the claimed effects of inequality. Priority is given to indicators which observe levels of inequality across the different dimensions, while complementary indicators which measure negative effects of inequality are incorporated in order to provide a more comprehensive evaluation of the phenomenon. For instance, the percentage share of all income earned by the middle class, or the share of all national income that goes to the labour workforce, represent indicators which measure one aspect of the level of inequality. Meanwhile, literature exists which posits causal links between victimisation and adult mood and anxiety rates, thus these can be interpreted as reflecting to some degree the re-

sponses to changing levels of inequality.

Data Temporal Coverage

The aim of this project was to study the changes in the levels of shared prosperity over time, therefore the SPI extends back to 1982, which is as far as the available data supports. Extending into the 1980s is important because from this period onwards, New Zealand experienced unprecedented economic re-alignments which are well documented in terms of their social-economic ramifications. Much of the data relating to income and wealth levels, material hardship as well as employment stretched back to the 1980s. Even though a number of other important indicators from the complete set of dimensions were not all available in this period, it was decided to begin the SPI at 1982 and to augment it with indicators as they become available in time.

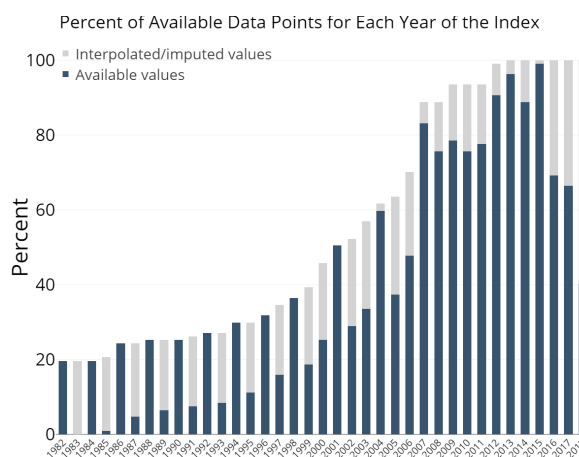


Figure 1: Percent of available and interpolated values across all years.

The darker bars of Figure 1 show the percent of the total 109 indicators that were available in each year from 1982. Sharp fluctuations can be seen in the figure for the early years due to bi-yearly capturing of many of the indicators in the early period. The figure shows that around 20% of all the indicators were available in 1982 and approached 100% by 2013. It should be noted that although all indicators became available by 2013, values for some of these are still missing. This is due to the fact that not all indicator values are recorded every year after they become available, but may instead have irregular data-capture frequencies. All indicators report values per calendar year. The data used for suicide rates reports figures from June-to-June of each year. In such an instance we register the indicator value against the year of each June-year-end.

¹⁰We make the assumption that there is strong basis to the literature which claims associations, and at times, causal links between certain negative societal phenomena and inequality, and that these correlates should be measured.

3.2. Missing Values

All composite indices are challenged by missing values. Additionally, the SPI extends back more than three decades, and data collection throughout the 1980s and 1990s was not as comprehensive nor as frequent as it is now. This means difficult choices needed to be made regarding how to formulate a strategy for handling missing data.

Imputing missing data over large stretches of time is hazardous, so it was decided to devise a cautious strategy that minimises the risks of introducing a strong bias into the SPI. Our missing data imputation strategy is in line with that used by Legatum [31] and can be summarised as follows:

1. If missing data are encountered and no prior data points are available as is the case throughout much of the 1980s and 1990s, missing data is not imputed.
2. If data are missing, but prior and later data points exist, then data is imputed using a series of linear regressions between existing points in the indicator.
3. If data are missing and only a prior data point exists, then the latest available prior data point is assigned to the given date, up to three years ahead.

The grey shaded areas in Figure 1 depict the percent of indicator values that could be imputed/recovered for each year according to the imputation strategy above. The figure highlights the key attribute of the imputation strategy, which did not attempt to re-create historic values for data points prior to the first measurement of the given indicators. Figure 2 shows the sharp decline in the percent of missing indicator values that needed to be imputed, with the period beginning in the early 2000s marking the phase where a majority of data points did not require imputation. The years from 2016 onwards highlight a different challenge inherent in developing a composite index of this nature, namely that the reporting period of some indicators can have a significant delay. As the graph approaches 2018, a majority of the data points across the 109 indicators are still not available. In these instances, the indicators with long reporting delays will be populated with actual data as it becomes available and, the overall SPI index will be revised accordingly.

3.2.1. Composition of Each Dimension

The total number of indicators assigned to each dimension, ordered by the largest to smallest, can be seen

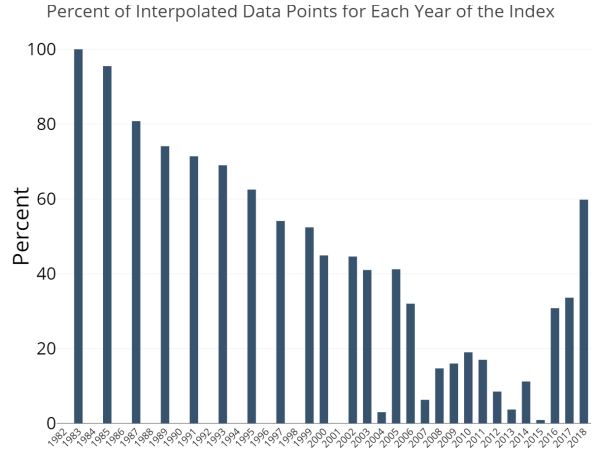


Figure 2: Percent of missing values which could be interpolated across all years.

in Figure 3, demonstrating an unequal allocation of indicators to each dimension. This is a function of the selection criteria described in section 3.1, which reflects both the complexity of the various measurable aspects of each dimension as well as the differences in data availability across the dimensions, rather than an implicit judgment of the relative importance of each dimension.

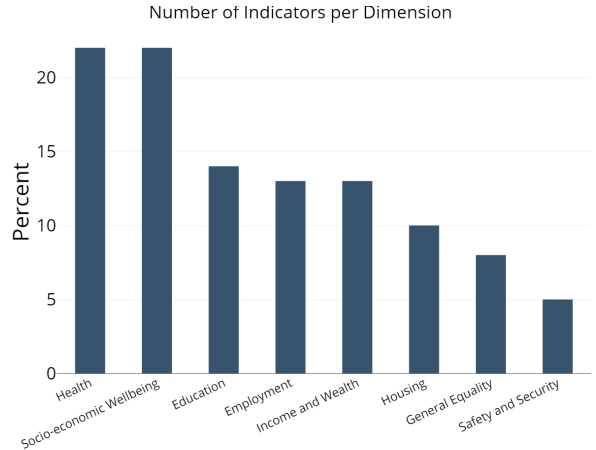


Figure 3: Total number of indicators per dimension.

3.3. Weighting and Aggregation

The question of what weights should be assigned to each indicator relative to others is difficult to objectively answer. For this reason, many composite indices employ an equal weighting scheme in an attempt to avoid this task (e.g see [29]). However, a decision not to use weights is not a neutral position, since it implies that

all indicators have the same value and are of the same importance, and prevents one from taking important aspects into consideration.

Given the multidimensional approach of the SPI, we are explicit about stating that the resulting 109 indicators do not all have the same capacity to capture the idea of shared prosperity. In addition, some indicators inevitably share correlations with others and can represent instances of double-counting. For these reasons, we adopted a position of assigning weights to each of the indicators based on the four aspects of the selection criteria: relevance, supporting literature, contribution to the index, and quality.

The group deliberated and came to a consensus on a weighting scheme for each indicator. Our starting point was to assign a base weight of 1, which was then adjusted either up or down in increments of 1/4 (or 0.25) based on each of the above four factors. The resulting range of weights for all indicators was 0.25 to a maximum possible weight of 2. Indicators with a weight of zero were excluded from the index.

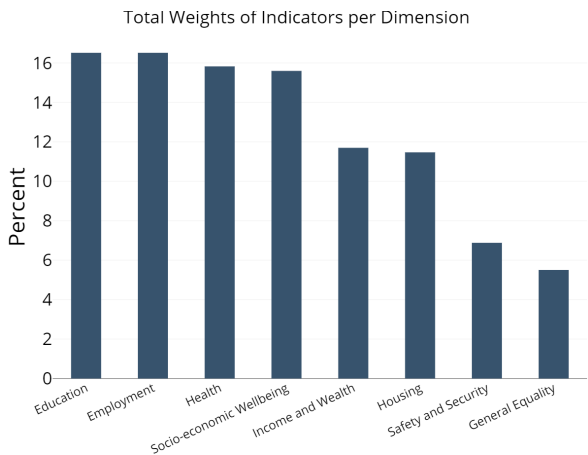


Figure 4: Distribution of weights across all dimensions.

The exercise of assigning weights to each indicator had an effect in altering the contribution that each dimension makes to the overall index. This can be seen in Figure 4. The figure shows that Education, Employment, Health and Deprivation dimensions have a comparable input into the overall index and rank as the highest four dimensions in this regard. However, since not all indicators have been available from the outset of the period covered by the SPI, different dimensions have dominated at different periods of the index. Figure 5 shows the influence that each indicator has had on the SPI since 1982. The figure shows that Income and Wealth and Deprivation dimensions have dominated the

SPI until the early 2000s, after which more diverse data became available and a more balanced and comprehensive summary of shared prosperity could be ascertained.

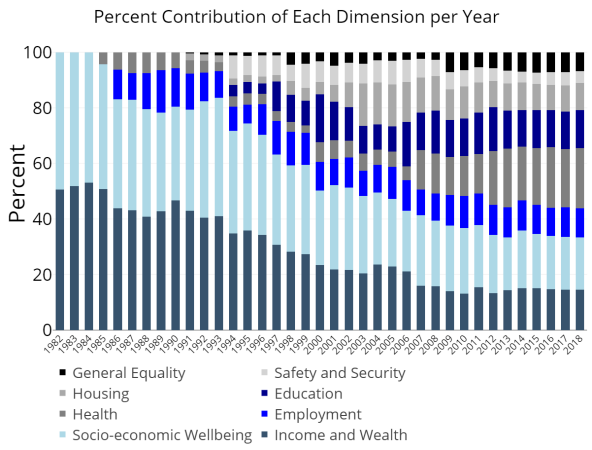


Figure 5: Contribution of each dimension according to all the indicator weights, across all the years.

Given that the assignment of weights to different indicators invites critique, a thorough investigation was conducted in order to determine the effects of different weighting schemes on the overall SPI. This was conducted through empirical simulation using the Monte Carlo method. A total of 1000 different versions of the SPI were generated by randomly assigning weights to each indicator, ranging from the following possible values: 0.25, 0.5, 0.75, 1.0, 1.5, 2.0. An analysis of this empirical undertaking considered whether the trends in the SPI over the course of time were more a function of weights that we assigned, or of the particular phenomena under observation. We also examined the effects of producing an index without weights. The findings from this analysis are presented in the Results section together with the SPI index.

3.4. Normalisation

Due to the fact that the indicators vary widely in their measurement units, it was critical that they all be normalised and thus transformed into a common scale before data aggregation could occur. There is a wide range of normalisation techniques that can be used for this task and they all have advantages and disadvantages. In this work, we have opted for Min-Max normalisation which scales all data into the range 0 to 1. Min-Max reduces the smallest value in an indicator to 0, while the largest value is assigned 1. The remaining values are arranged between 0 and 1 based on their proportionate distance to one another in their original scale. The

weakness of Min-Max lies in the fact that outliers could potentially distort the transformed indicator, resulting in the bulk of values being pushed either towards 0 or 1. Alternatively, Min-Max normalisation may increase its effect on the composite indicator by widening the range of an indicator whose values lie within a small and tight interval.

Normalisation must be performed in a consistent way for all years. This raises some potential issues. If normalisation is performed on the most recent 2018 data, subsequent years will need to be normalised based on all the minimum and maximum values from data up to 2018. If subsequent years produce values which exceed the minimum and maximum values of the 2018 data, then the subsequent normalisation will produce transformed values that fall outside the 0 to 1 range. In order to allow future values to grow or shrink, while preserving the 0 to 1 range, the Min-Max normalisation was adjusted as follows for each indicator:

1. calculate the range between the minimum and the maximum values
2. subtract 75% of this range from the minimum value and make this the new minimum
3. add 75% of the original range to the maximum value and make this the new maximum
4. normalise all the data based on the new minimum and maximum values

The effect of the above strategy future-proofs the data by enabling the indicators to grow or decrease beyond the extreme values it has encountered up until 2017. However, an artifact of this adjusted normalisation results in the normalised values initially falling between 0.3 and 0.7 range.

A potential problem still remains for some indicators where their minimum and maximum values are in close proximity to the absolute bounds. For instance, the indicator measuring the difference in percentages of low income earners by gender has values which range from 0% to 4%. Without further adjustment, the above normalisation approach would transform 0% to approximately 0.3 which is obviously incorrect because an improvement on 0% is not possible and the transformed value would not be able to reduce below 0.3. Therefore, for certain indicators the minimum range begins at 0.

4. Results

4.1. Composite Index

The composite index provides interesting insights into the change of prosperity sharing over the period

assessed. In the 1980s, New Zealand experienced comparatively high levels of sharing with the highest score being 0.71 in 1986. It was during this time that New Zealand had a reputation of being one of the most egalitarian countries in the western world. Between 1987 and 1994, however, the level of sharing dropped steeply, falling from 0.71 to a low of 0.49. This reduction in sharing coincided with a period of political unrest, major economic changes and an economic recession from the mid 80s to the early 90s. After a snap election in 1984, the new government introduced sweeping reforms to liberalise and diversify the economy. These reforms continued under two different governments until 1993. Between 1990 and 2000, the level of sharing in New

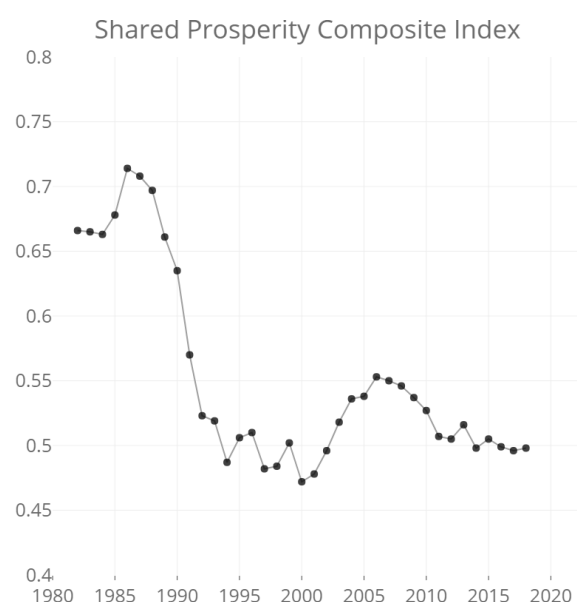


Figure 6: The Shared Prosperity Composite Index

Zealand was fairly constant at a level of around 0.48 before rising again to a short term high of 0.55 in 2006. Again, the change in sharing seems to coincide with a change in economic performance. In 1998, the New Zealand economy entered a period of significant growth that lasted until 2006. Since 2007, the New Zealand SPI has gradually decreased and has flattened out to around 0.5 in the last two years. Remarkably, the considerable slowdown of economic growth during the Global Financial Crisis in 2007 and 2008 did not have a major impact on the level of sharing, but neither has the steady economic growth in recent years.

Figure 7 highlights the change (positive or negative) of each dimension over time. No consistent pattern seems to appear (e.g. the socio-economic wellbeing dimension improved in 2013 and 2015 but worsened con-

siderably in 2014). In 2018, we see a significant increase in the safety and security dimension and a mild decrease in the housing and health dimension. Look-

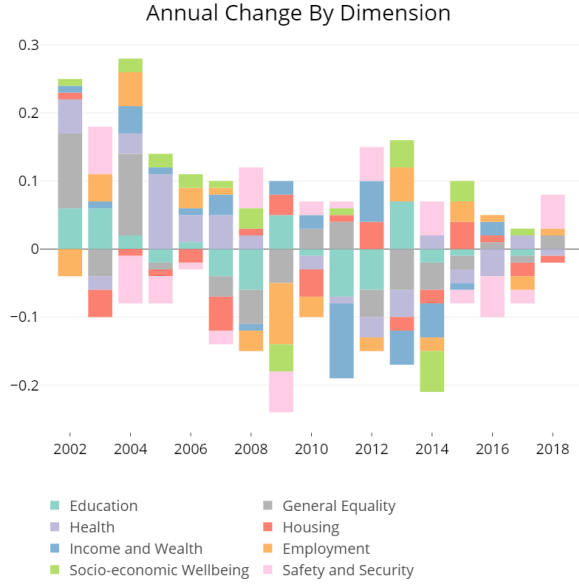


Figure 7: Annual change by dimension

ing at the individual dimensions, we observe the lowest level of sharing /inequality in the income and wealth dimension (0.38) which is in line with a global observation that in terms of wealth and income, the gap between the rich and poor is increasing. The employment dimension has the highest score (0.56) which is driven by the record highs in employment levels we currently have in New Zealand. Housing, health and education have scores just below the composite value while the deprivation, safety and security, as well as the general inequality dimensions sit above the composite value of 0.5.

4.1.1. Sensitivity Analysis

The indicator weighting scheme is one of a number of possible schemes which could have been devised. It is important to examine how influential the weighting scheme is in generating the above results. Table 1 lists each year, together with its corresponding SPI value and its ranking in respect to all the other years. The year with the highest SPI value is 1986 and the year with the lowest SPI value is 2000. We can also generate an identical table for the SPI index using an unweighted scheme and then use linear regression to help us determine how closely the values from each SPI correlate. The higher the correlation, the less significance to the overall outcomes the weighting scheme has. Figure 8 correlates

the rank of the weighted SPI index on the x-axis with the ranks of the unweighted SPI index on the y-axis. The figure shows a near perfect fit with a correlation coefficient of 0.99. The extremities of the ranks (ie. the years which have fared the worst and the best) display a perfect fit, while the years which cover the middle range show a small degree of variation.

Year	SPI Value	Rank
1982	0.666	5
1983	0.665	6
1984	0.663	7
1985	0.678	4
1986	0.714	1
1987	0.708	2
1988	0.697	3
1989	0.661	8
1990	0.635	9
1991	0.57	10
1992	0.523	18
1993	0.519	19
1994	0.487	33
1995	0.506	24
1996	0.51	22
1997	0.482	35
1998	0.484	34
1999	0.502	27
2000	0.472	37
2001	0.478	36
2002	0.496	31
2003	0.518	20
2004	0.536	16
2005	0.538	14
2006	0.553	11
2007	0.55	12
2008	0.546	13
2009	0.537	15
2010	0.527	17
2011	0.507	23
2012	0.505	25
2013	0.516	21
2014	0.498	29
2015	0.505	25
2016	0.499	28
2017	0.496	31
2018	0.498	29

Table 1: The SPI values for each year and its relative rank to other years ranging from 1982 to 2018. Larger SPI values represent higher ranks.

Similarly, Figure 8 correlates the actual values of the weighted SPI index on the x-axis with the values of the unweighted SPI index on the y-axis. This figure also confirms a near perfect fit, suggesting that the effect of

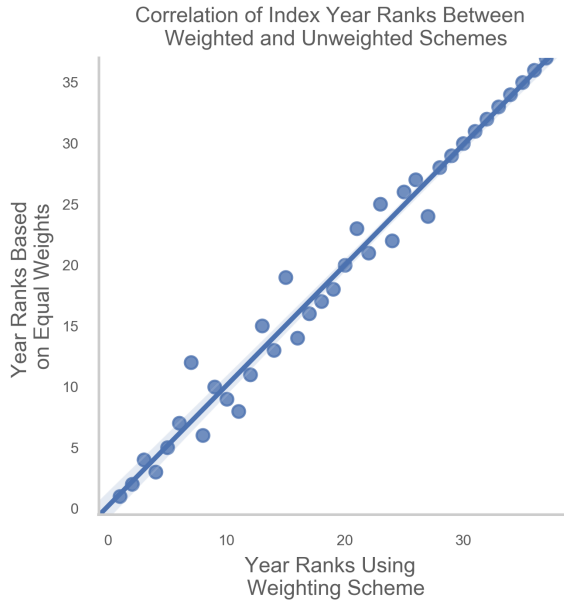


Figure 8: Correlation between uniform and unweighed index.

the chosen weighting scheme is negligible in respect to a scheme which does not utilise weights.

We extend our analysis of indicator weighting by simulating a random weight allocation to all the indicators using the procedure outlined in Section 3.3. A total of 1,000 SPI indices were generated with random weight allocations. We calculated the median of the SPI values for each year, as well as the median ranks of each year and depicted these using a series of box plots. These box plots communicate the distribution of the values based on quartiles. The boxes enclose the range of values that fall within the second and third quartiles, the whiskers above and beyond capture a range of values that extend up to one and a half times the height of each box, in both directions. Figure 10 depicts the distribution of SPI values generated through random weighting for each year. It is evident in the figure that the overall trends and movements of the medians closely resemble the trajectories of the chosen weightings for the current SPI index in Figure 6.

Likewise, Figure 11 shows the distribution of SPI ranks generated through random weighting for each year. There is more volatility depicted in the distribution of the ranks; however, once again, the overall movements of the simulated SPI index conform closely with those of the weighted SPI index in Figure 6.

The conclusion drawn from the analysis of unweighted SPI and large scale randomly weighted simulations is that the weighting scheme is not the key de-

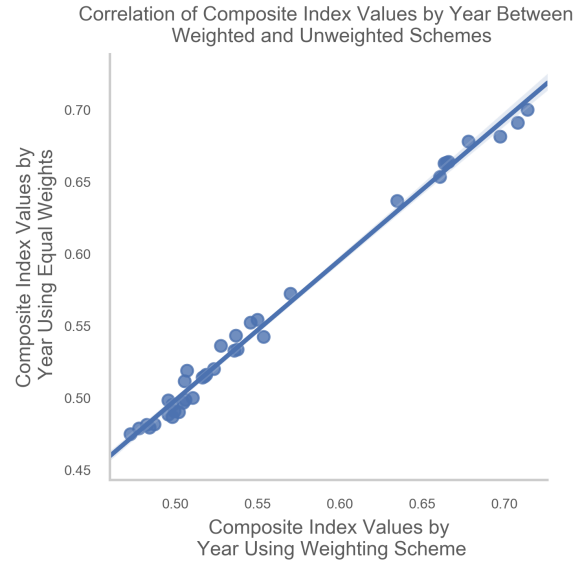


Figure 9: Correlation between uniform and unweighted composite index values.

terminant in the results of the SPI index. Rather, the indicators themselves and the underlying data which they measure are the primary determinants of the patterns observed. While the weighting scheme can indeed be critiqued and questioned from various perspectives, the final results of the SPI index cannot easily be dismissed on the basis of disagreements surrounding the weighting scheme. The SPI index does indeed accurately describe the observed trends given the chosen indicators and it provides robust means for comparative analysis between the different years that are covered by the index.

4.2. Income and Wealth Distribution

In line with the experience in many other countries, we find that inequality has trended upwards since the mid-1980s. The P80:P20 ratio measures the income of relatively wealthy households (located at the 80th percentile) against those of relatively poorer households (located at the 20th percentile). In the early 1980s this measure averaged around 2.30, increasing to around 2.6 by 2010. In other words, in the 1980s a typical household at the 80th percentile earned 2.3 times as much as a typical household as the 20th percentile; this has increased to around 2.6 times by 2010. A similar pattern is observed in the Gini coefficient measure of income inequality, which rose from 27% in the 1980s to around 35% by 2015. (A Gini coefficient of 1 is equivalent to one person earning 100% the income, while a

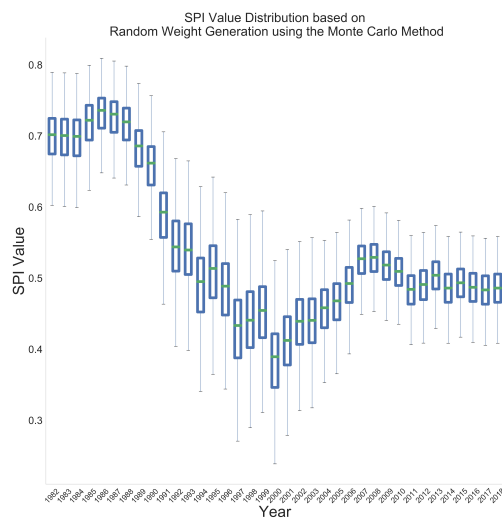


Figure 10: Monte Carlo simulation.

Gini coefficient of 0 is equivalent to complete income equality, where everybody has the same income.) As a result, the New Zealand Income Distribution Pillar, which is based on a range of income distribution measures, has declined from 0.65 in the 1980s below 0.4 in recent years.

4.3. Socio-economic Wellbeing

The Socio-economic Wellbeing index encompasses 19 poverty indicators, and two financial health measures: personal insolvencies and loan delinquencies. Just over half the poverty indicators extend back to 1982. The other poverty measures begin in 2000 or later. Loan delinquencies data are available from 1992, and personal insolvency data from 1999.

The index decreased sharply from 1990 to 2000, and has improved ever since, with some variability following the introduction of several poverty indicators in 2007. We observe increases in most poverty indicators from 1990, driving the drop in the index. The recovery from 2000 appears to be driven by improvements in certain anchored line poverty measures, including those relating to child and elderly poverty.

4.4. Health

The Health Index contains data from 21 indicators, including physical and mental/emotional health measures, and health access and funding measures. Some indicator data are self-reported, others are objectively

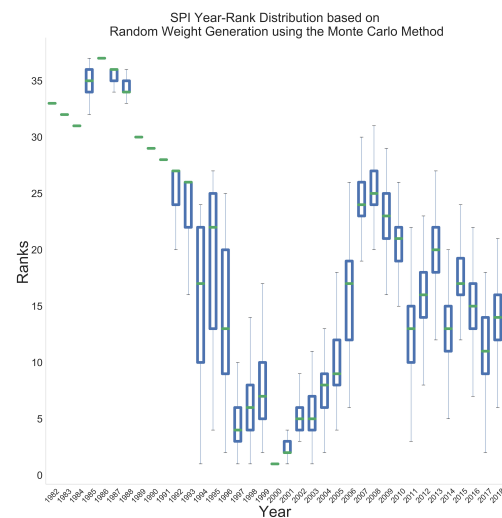


Figure 11: Monte Carlo simulation results based on composite indicator values.

measured. The index begins in 2007, which is when most indicators became available.

Funding indicators affect the index positively, therefore it is of note that the index has decreased from 2007, while health expenditure per capita has increased. This reflects a decrease in health expenditures as a percentage of GDP, and a possible worsening in actual mental and physical health, perceptions of health, and access to health services. While this decrease appears steep, it should be noted that the index only covers a small range of values, and a short period of time.

The suicide indicator does not follow the overall trend displayed by the other indicators, and is more variable.

4.5. Education

The data shows some broad trends. In particular, the financial burden of student loans has substantially increased, especially since 2009 (for example, loan balances as a percentage of median income increased from approximately 42% in 2009 to 56% in 2016). This mirrors an increase in university fees proportional to average income during the same period (although this trend is reversed in other tertiary institutions). All of these findings coincide (perhaps unsurprisingly) with a falling rate of tertiary participation overall (after peaking at 13.5% in 2005, this has dropped to 9% in 2017), in spite of generally increasing government expenditure on education. Finally, a general pattern might be developing where the premium gained in hourly rate earned with

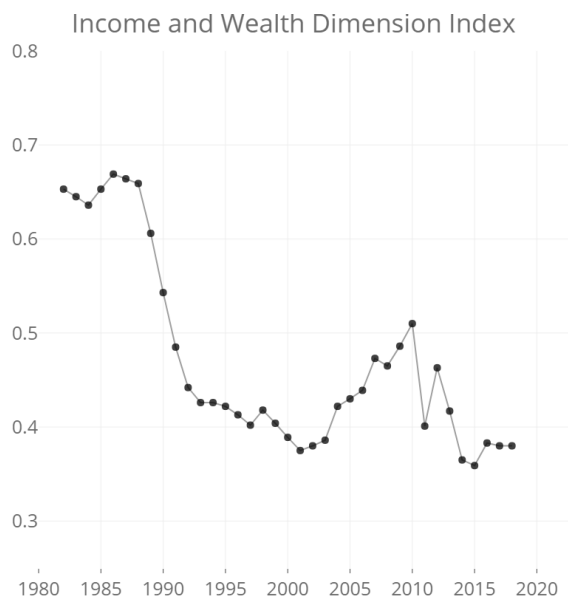


Figure 12: SPI Income and Wealth Dimension Index.

greater education has been falling, while the premium gained in weekly earnings with greater education has risen. This may indicate that higher levels of education are becoming more important as a way to access full-time or steady employment, rather than securing jobs that pay more for the work done.

4.6. Employment

Employment is not only a key contributor to a country's prosperity but also to personal wellbeing. Having a job can provide people with a source of income, fulfillment, self-esteem, skills and competencies as well as a social network. Employment levels in New Zealand have increased in recent years, and currently around 76% of the working-age population has a paid job. This is well above the OECD average of 67%.

When thinking of prosperity sharing, it is the unemployment level (or the number of people actively searching for a job but are unable to find employment) that is important, rather than the employment level. Long-term unemployment can have a substantial negative impact on a person's wellbeing and self-worth and affects the entire family. Currently the unemployment rate in New Zealand is below 4%, one of the lowest values in the past thirty years, and only 0.7% of the labour force has been unemployed for more than a year (compared to the OECD average of 2%). A measure of employment insecurity is the expected loss of earnings when a person becomes unemployed. It incorporates the likelihood of losing your job, the time it takes to find new em-

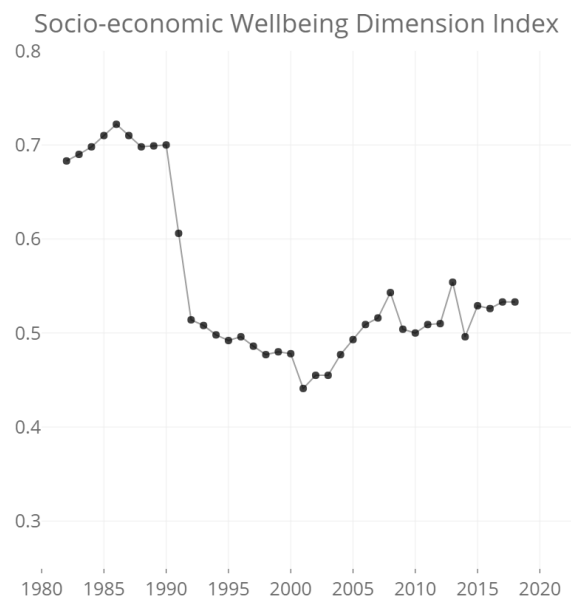


Figure 13: SPI Socio-economic Wellbeing Dimension Index.

ployment and financial unemployment benefits. Higher levels of insecurity make people more vulnerable. Currently, workers in New Zealand would lose around 4.5% of their earnings if they become unemployed. This is in line with the OECD average.

Wage levels are an important aspect of employment quality and an indication of how well prosperity is shared. Around 12% of the New Zealand workforce is on low wages when using the OECD definition (OECD average is 15%) and this number increases to 25% when using the minimum wage as a benchmark.

4.7. Housing

The affordability of housing, both for renters and owners, have deteriorated since the end of the Great Recession of 2008. The House Affordability (Purchase) measure calculated by the MBIE decreased from a high of 0.84 in 2008 to around 0.78 by 2016, recently improving slightly to 0.79. Similarly, the House Affordability (Rental) measure has decreased from 0.67 in 2011 to below 0.6 in 2018. Perhaps as a result, home ownership has been decreasing steadily, as segments of the population are priced out of home-ownership by steady increases in house prices. Indeed, while in 1991 73% of households were owner-occupied, only 63% of household were owner-occupied in 2018. Some of the dislocation this has caused can be observed in the sharp rise in Priority A state housing applicants, which has increased from below 0.05% of the population to above

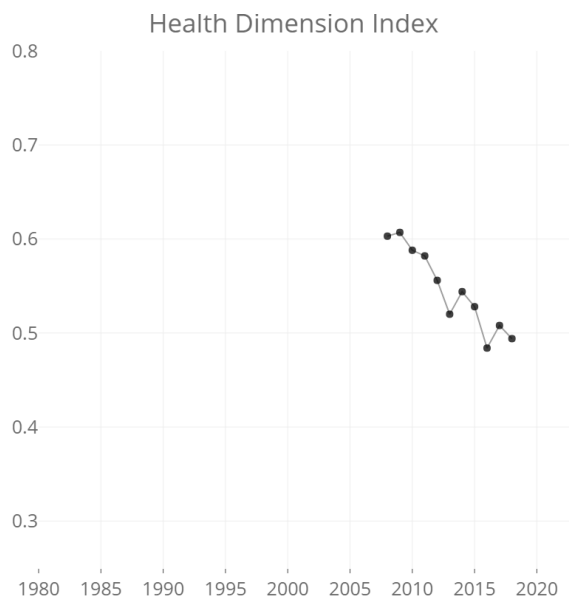


Figure 14: SPI Health Dimension Index.

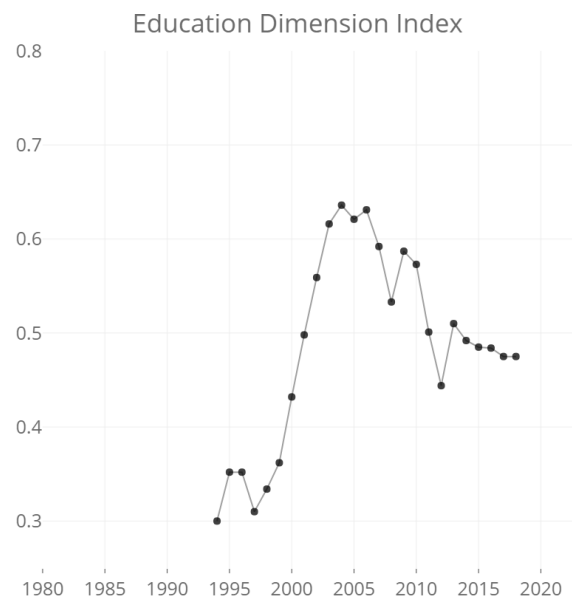


Figure 15: SPI Education Dimension Index.

0.4% of the population – an eight-fold increase over the past 15 years.

4.8. Safety and Security

The Safety and Security Index starts in 1994. At that time, the index includes crime victimisation and the rate of murders and homicides. Indicators for the remand and sentenced populations are included from 1999, while the post-sentence population is included from 2003. Overall the Safety and Security Index has an increasing trend across the entire date range (an improvement), with some variability since 1999. The variability coincides with the introduction of imprisonment rates to the index. While crime has decreased, the population percentages for prisoners in remand and post-sentence offenders have concurrently increased. There is no evident trend for sentenced prisoners.

Both crime victimisation and murders and homicides have declined overall since 1994, with some greater variability in the rate of murders and homicides. A higher degree of natural variation might be expected due to murders and homicides being rare events by comparison to overall crime.

There is no significant trend across the date range for the sentenced population, however there is an increase in the rate between 2003 and 2007, a decline until 2014 and an increase since then. The remand population has increased over the entire date range. It should be noted that the increasing trend is broken by a period between 2010 and 2014 where the remand rate

dropped. The post-sentence percentage has increased overall since 2003.

4.9. General Equality

Our findings for some of these variables are limited by the fact that they have only been measured relatively recently. There is a difference of 15.9% between Māori and the overall population who report their income is 'just enough' or 'not enough' money for life's essentials. Inequalities regarding this question also remain between renters and those who own their home (22.4%) and between long-term immigrants and the overall population (5.2%). None of these discrepancies have improved appreciably since 2009 when the measures began. The gender pay gap has been improving (approximately a 7% improvement in 20 years), but it remains at 9.2%. Although inadequacy of income does vary across the regions and may be worsening, this difference is actually quite small.

5. Discussion

Quantifying a complex concept such as prosperity is challenging, and assessing whether some groups of society benefit more than others even more so. There is strong evidence that unjust distribution of prosperity has negative social and economic consequences which suggests that the issue of prosperity sharing needs to be addressed. The SPI highlights a considerable variation

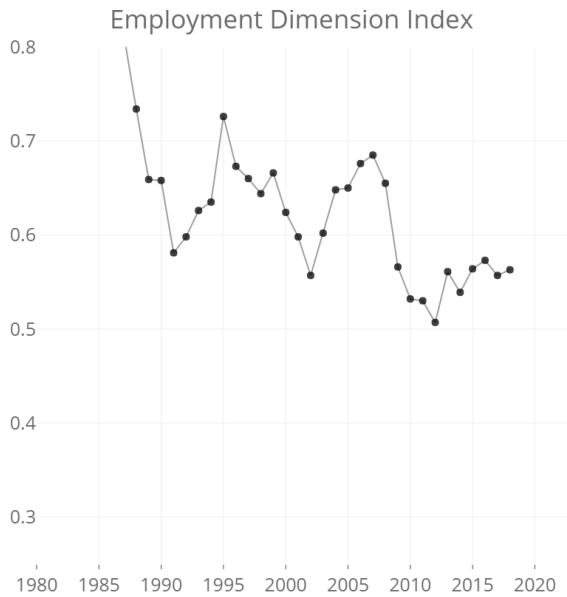


Figure 16: SPI Employment Dimension Index.

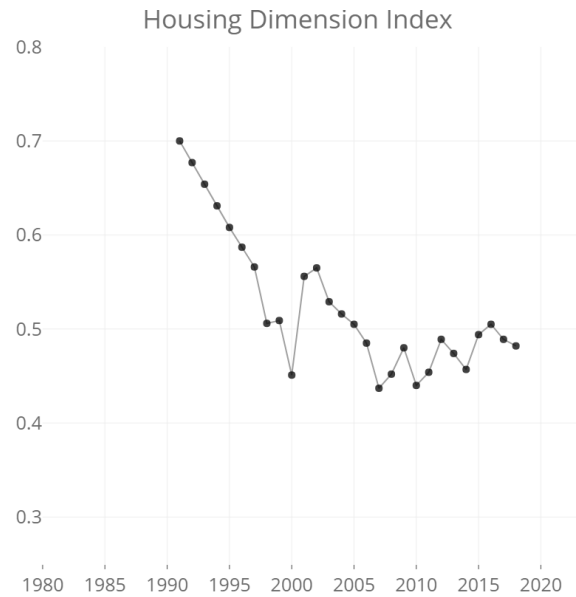


Figure 17: SPI Housing Dimension Index.

and change in prosperity sharing over the past 35 years. While analysis of the individual dimensions highlights which dimensions are driving the change, we have not specifically analysed which exogenous macroeconomic factors might impact on the composite index. For example, looking at New Zealand's GDP over the same period suggests that during times of economic growth, the level of sharing increases and during times of economic recession (e.g. the stock market crash in the 1980s or the global financial crisis in the early 2000s) sharing drops as well. It would also be interesting to check if the level of sharing is influenced by the political orientation of the government.

In addition to social and economic considerations, a society has a moral obligation to look after all its members. This raises the question if an optimal or minimal level of sharing can be identified. In the context of a free market economy, differences in prosperity participation are expected and accepted which implies that maximising the level of sharing is not the goal. We refrain from identifying an optimum, but point out that the level of sharing has fallen considerably between 1986 and 2018.

It would be interesting to see how the level of prosperity sharing in New Zealand differs from other countries. As highlighted before, the methodology of the SPI could be replicated and applied to other countries. However, as prosperity means something different in every country, different variables might be used. Furthermore, availability of data might also vary from country to country, which means that SPI values might not be

comparable.

6. Conclusion

The SPI is the first attempt to quantify and visualise prosperity sharing in New Zealand. We have created eight dimensions that we believe capture the core of prosperity sharing and have used national and international data sources to compute a composite index. Using a composite index provides a big picture, yet allows for an investigation of the impact and change of each dimension. It is our hope that the SPI complements other measures of wellbeing and assists the government with initiatives aimed at improving the wellbeing of New Zealanders.

7. Acknowledgements

We would like to acknowledge the financial support of the Knowledge Exchange Hub (KEH) at Massey University (New Zealand) who funded the project. We would also like to thank Simon Hunter from KPMG (New Zealand) and Fiona Mogridge who were involved in the very early stages of the project. We appreciate the help we received from all Government agencies who have kindly assisted us in procuring all the necessary data for this project, as well as David Chaston from interest.co.nz. Thanks also to Bill Kirkley who was part of the project team in 2018. Special thanks goes to Erdem

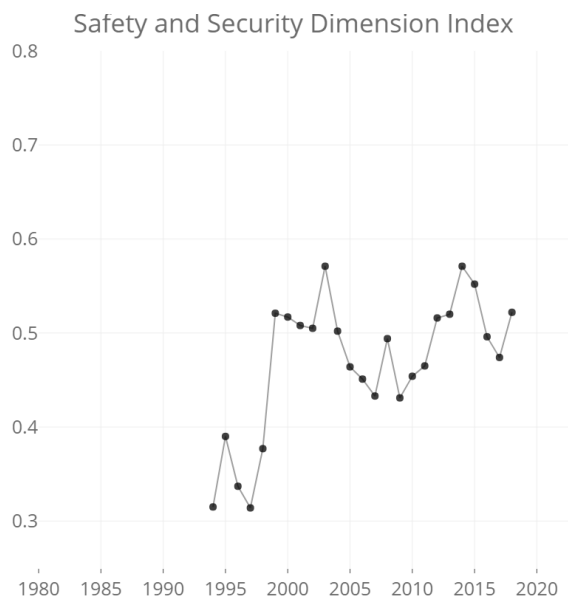


Figure 18: SPI Safety and Security Dimension Index.

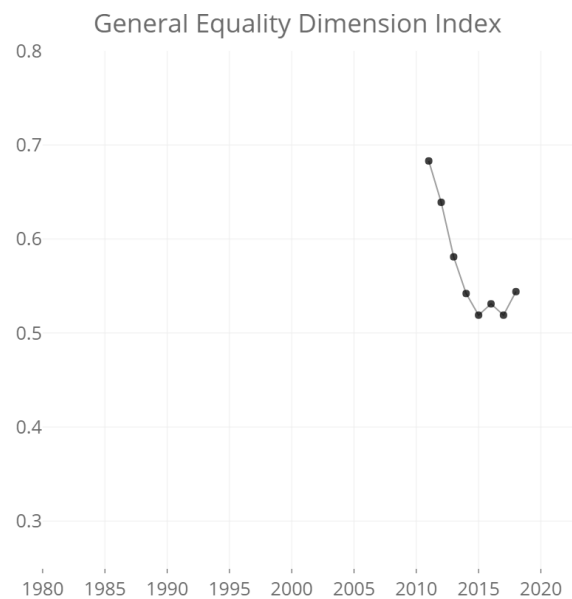


Figure 19: SPI General Equality Dimension Index.

Alpkaya for his dedication, help and hard work with the ongoing development of the website.

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Appendix A. List Of Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Q5:Q1 income share ratio	Ratio of total household income shares: fifth quintile to first quintile, before housing costs, square root scale.	Ministry of Social Development	Total income shares are a financial measure of how well prosperity is shared. As the total income shares of those in the top and bottom quintiles diverge (income inequality increases), the ratio increases. OECD publications widely use the square root equivalence scale and before housing cost measures. The effects of housing affordability are captured in the Housing and Socio-economic Wellbeing dimensions.	22.0	4.0-5.9	0.75
D10:D1 income share ratio	Ratio of total household income shares: tenth decile to first decile, before housing costs, square root scale.	Ministry of Social Development	Decile ratios of income shares are a measure similar to quintile ratios. There is some unreliability in the bottom decile data quality [32]. As the total income shares of those in the top and bottom deciles diverge (i.e. income inequality increases), the ratio increases.	22.0	6.0-9.9	0.75
D10:D1-4 income share ratio (Palma)	Ratio of total household income shares: share of tenth decile to share of lowest four deciles, square root scale.	Ministry of Social Development	Gabriel Palma observed that income shares for the middle 50% are relatively stable across middle and higher income countries, and that differences were in the tails of income distributions. The Palma measure is the ratio of income shares in these less stable deciles, where movement in income shares is more apparent. As the total income shares of those in the top and bottom deciles diverge (i.e. income inequality increases), the ratio increases.	22.0	0.9-1.4	1.5
P90:P10 income ratio	Ratio of 90th to 10th percentile incomes, before housing costs.	Ministry of Social Development	Percentile ratios of income (as opposed to total income shares) give a sense of the distance between points in the income distribution. As the ratio increases, the points become more distant (inequality increases). The 90:10 income percentile measure, as opposed to the 10:1 income share decile measure, has the benefit of not being affected by the data quality issues in the lower range while still providing an indication of the disparities between the two extremes.	21.0	3.1-4.4	0.75
P80:P20 income ratio	Ratio of 80th to 20th percentile incomes, before housing costs.	Ministry of Social Development	The 80:20 measure has more stability than the 90:10 measure, and encompasses 60% of the population. As the incomes of those in the top and bottom percentiles diverge (i.e. income inequality increases), the ratio increases.	22.0	2.2-2.8	0.75
P80:P50 income ratio	Ratio of 80th to 50th (median) percentile incomes, before housing costs.	Ministry of Social Development	The 80:50 measure gives an indication of the disparity of higher incomes to the median. As the incomes of those in the top and middle percentiles diverge (i.e. income inequality increases), the ratio increases.	22.0	1.7-1.5	0.75
P50:P20 income ratio	Ratio of 50th (median) to 20th percentile incomes, before housing costs.	Ministry of Social Development	The 20:50 measure gives an indication of the disparity of lower incomes to the median. Unlike the other ratios, as this ratio increases, the level of inequality decreases.	22.0	0.6-0.7	0.75
GINI	Gini coefficient, multiplied by 100, before housing costs.	Ministry of Social Development	Gini represents the ratio of the area between the cumulative income (Lorenz) curve and the cumulative line of equality, to the total area under the line of equality. The coefficient will range between 0 and 1 where 0 is perfect equality and 1 is perfect inequality. Gini is a commonly used measure for income inequality and has the benefit of being representative of the entire income distribution.	22.0	27.0-35.0	2.0
Top 10 percent wealth share	Percent share of all wealth by the Top 10%.	Statistics New Zealand	Wealth shares are another perspective on how well prosperity is shared. Incomes do not fully represent inequality of financial means - over time we may see wealth concentrate, exaggerating inequality, even as incomes stabilise.	5.0	54.0-59.0	0.75
Top 5 percent wealth share	Percent share of all wealth by the Top 5%.	Statistics New Zealand	Wealth shares are another perspective on how well prosperity is shared. Incomes do not fully represent inequality of financial means - over time we may see wealth concentrate, exaggerating inequality, even as incomes stabilise.	5.0	39.0-45.0	0.75
Top 1 percent wealth share	Percent share of all wealth by the Top 1%.	Statistics New Zealand	Wealth shares are another perspective on how well prosperity is shared. Incomes do not fully represent inequality of financial means - over time we may see wealth concentrate, exaggerating inequality, even as incomes stabilise.	5.0	18.0-22.0	0.75
Lower deciles income share	Percent share of all income earned by lower earners as defined by the UN (Deciles 1 - 4).	Ministry of Social Development	This is a part-to-whole perspective of total income shares: how the lower deciles fit into the larger distribution.	26.0	18.9-22.8	1.5
Middle class income share	Percent Share of all income earned by the Middle Class as defined by OECD (75%-200% of median).	Ministry of Social Development	This is a part-to-whole perspective of total income shares: how the middle class fits into the larger distribution.	26.0	53.2-64.6	1.0

Table A.2: Income and Wealth Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Prevalence of poverty 60% ML	Percentage of households earning below 60% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Poverty as income below 60% of a moving line median. A widely used definition of poverty is earning below 60% of median income. By definition, such households receive a low share of financial prosperity. The contemporary median is a moving line measure of poverty, where the low-income threshold is relative to the contemporary median of a given year. The after housing costs measure allows for the significant impact of housing costs on the likelihood that someone will experience poverty. For instance, a household may have low income, but if housing costs are low, perhaps due to debt-free home ownership or free accommodation, the members of that household may have more discretionary income than someone paying rent to accommodate a large family. Poverty as income below 50% of the moving line median.	20.0	13.0-23.0	0.75
Prevalence of poverty 50% ML	Percentage of households earning below 50% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Poverty as income below 50% of an anchored line median. For the anchored line median, the low-income threshold is kept constant (at the 2007 level) in real terms. Over time this measure will indicate whether income has improved in real terms, rather than in relation to the average household.	20.0	8.0-16.0	0.75
Prevalence of poverty 50% AL	Percentage of households earning below 50% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Poverty as income below 60% of the anchored line median.	20.0	11.0-26.0	0.75
Prevalence of poverty 60% AL	Percentage of households earning below 60% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Poverty as income below 40% of the anchored line median, to represent more extreme cases of poverty.	11.0	16.0-28.0	0.75
Prevalence of poverty 40% AL	Percentage of households earning below 40% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Poverty as income below 60% of moving line median. We might expect that in a society where prosperity is less well shared, the more vulnerable, like the elderly, may be impacted more. The elderly are also a category of the population (as with young couples) that can end up 'asset rich and cash poor' with money tied up in assets like property and while existing on a low income."	20.0	4.0-10.0	0.75
Prevalence of poverty, 60% ML, elderly	Percentage of elderly in households earning below 60% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Elderly poverty as income below 60% of the anchored line median.	20.0	3.0-12.0	0.75
Prevalence of poverty 50% ML, elderly	Percentage of elderly in households earning below 50% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Elderly poverty as income below 50% of the moving line median.	20.0	1.0-8.0	0.75
Prevalence of poverty 50% AL, elderly	Percentage of elderly in households earning below 50% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Elderly poverty as income below 50% of the anchored line median.	20.0	2.0-8.0	0.75
Prevalence of poverty 60% AL, elderly	Percentage of elderly in households earning below 60% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Elderly poverty as income below 60% of the anchored line median.	9.0	6.0-12.0	0.75
Poverty risk ratio, 60% AL, single under 65	Poverty risk ratio for Single Under 65 households earning below 60% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Single under 65 poverty risk ratio at below 60% of the anchored line median. Poverty risk ratio is the ratio of the percentage of poverty in a subgroup to the percentage of poverty in the entire population. As this ratio increases, the risk of poverty for the subgroup increases.	9.0	1.2-1.8	0.75
Poverty risk ratio, 60% AL, solo parent	Poverty risk ratio for solo parent households earning below 60% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Solo parent poverty risk ratio at below 60% of the anchored line median. Sole parent families are at high risk of poverty, with research showing poverty is both a consequence and a predictor of parental relationship breakdown.	9.0	2.6-3.0	0.75
Poverty risk ratio, 50% AL, single under 65	Poverty risk ratio for Single Under 65 households earning below 50% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Single under 65 poverty risk ratio, poverty as income below 50% of the anchored line median.	9.0	1.5-2.1	0.75
Poverty risk ratio, 50% AL, solo parent	Poverty risk ratio for solo parent households earning below 50% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Solo parent poverty risk ratio, poverty as income below 50% of the anchored line median.	9.0	2.8-3.6	0.75
Prevalence of poverty, 50% ML, child	Percentage of children in families earning below 50% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Child poverty as family household income below 40% of anchored line median. Poverty proportionately affects more children than adults and the physical and mental health effects of childhood poverty can last a lifetime.	20.0	14.0-41.0	0.75
Prevalence of poverty, 60% ML, child	Percentage of children in families earning below 60% of 2007 median income (anchored line) after housing costs	Ministry of Social Development	Child poverty as family household income below 60% of anchored line median. Poverty proportionately affects more children than adults and the physical and mental health effects of childhood poverty can last a lifetime.	11.0	22.0-41.0	0.75
Prevalence of poverty, 40% ML, child	Percentage of children in families earning below 40% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Child poverty as family household income below 40% of moving line median. Poverty proportionately affects more children than adults and the physical and mental health effects of childhood poverty can last a lifetime.	19.0	6.0-14.0	0.75
Prevalence of poverty, 50% ML, child	Percentage of children in families earning below 50% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Child poverty as family household income below 50% of moving line median. Poverty proportionately affects more children than adults and the physical and mental health effects of childhood poverty can last a lifetime.	20.0	12.0-24.0	0.75
Prevalence of poverty, 60% ML, child	Percentage of children in families earning below 60% of contemporary median (moving line) income after housing costs	Ministry of Social Development	Child poverty as family household income below 60% of moving line median. Poverty proportionately affects more children than adults and the physical and mental health effects of childhood poverty can last a lifetime.	20.0	21.0-35.0	0.75
Prevalence of poverty, 60% AL, children with part time working parent/s	Percentage of children in families earning below 60% of 2007 median income (anchored line) after housing costs with one or more part time working parents	Ministry of Social Development	Child poverty in households with part time working parents, income below 60% of anchored line median. Households where the parents work part-time are more likely to be at risk of poverty, which proportionately affects the children living in these households more than the adults.	9.0	11.0-18.0	0.75
Prevalence of poverty, 60% AL, children with full time working parent/s	Percentage of children in families earning below 60% of 2007 median income (anchored line) after housing costs with one or more full time working parents	Ministry of Social Development	Child poverty in households with full time working parents, income below 60% of anchored line median. Households where the parents are working full-time on a low income may indicate casualised or precarious employment which can negatively impact upon the lives of their children.	9.0	33.0-44.0	0.75
Prevalence of personal insolvencies	Percent of personal insolvency for population aged 18+	Ministry of Business, Innovation and Employment Reserve Bank of New Zealand	Recent international research indicates that there is a nexus between bankruptcy and entrenched poverty, with many not being able to achieve the "fresh start" they were seeking."	10.0	0.1-0.2	1.0
Loan delinquencies	Percent of loan delinquencies for New Zealand banks	Ministry of Business, Innovation and Employment Reserve Bank of New Zealand	Loan delinquencies occur when the borrower misses their scheduled payment. Loan delinquencies are monitored as an indicator of financial pressure or hardship.	22.0	1.1-24.1	1.0

Table A.3: Socio-economic Wellbeing Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Health expenditure as a percentage of GDP	Health expenditure as percentage of GDP.	World Health Organisation	Spending a larger share of income on health may indicate reducing health in that country.	16.0	7.5-9.7	2.0
GDP	Health expenditure per capita, purchasing power parity percentage.	World Health Organisation	Comparison of health expenditure between countries taking into account the cost of goods for that country.	16.0	1606.3-3550.1	2.0
Prevalence of depression, adult	Percentage of adults (15+) who have ever been diagnosed with depression.	Ministry of Health	Mental health contributes to overall health. This information relates to the negative aspects of mental health.	7.0	10.4-16.7	0.75
Prevalence of self-rated health as good or better, adult	Percentage of adults (15+) self rating health as excellent, very good or good.	Ministry of Health	Mental health contributes to overall health. Here we present information on how healthy the citizens of a nation feel.	7.0	87.8-91.4	0.75
Prevalence of psychological distress, adult	Percentage of adults (15+) with high or very high levels of psychological distress defined as a score of 12 or more on the Kessler Psychological Distress Scale.	Ministry of Health	Psychological distress is a risk factor for mental illness, which can take a huge toll on individuals and their families, society, and the economy.	7.0	4.5-7.6	0.75
Prevalence of mood/anxiety disorders, adult	Percentage of adults (15+) who have ever been diagnosed as having depression, bipolar and/or anxiety disorder.	Ministry of Health	Mental health contributes to overall health. This information relates to the negative aspects of mental health.	7.0	12.7-19.9	0.5
Prevalence of healthy weight, adult	Percentage of adults (15+) with a healthy weight defined as a BMI of 18.5-24.9	Ministry of Health	Obesity is linked to several diseases and can be costly in both social and economic perspectives, whereas healthy weight can indicate better metabolic health.	7.0	31.9-36.2	0.75
Prevalence of unmet need for after-hours care due to cost, adult	Percentage of adults (15+) with an after hours medical problem who did not visit an after-hours medical centre due to cost in the past 12 months.	Ministry of Health	With increasing poverty, citizens may be unable to afford to pay for basic after-hours health care.	6.0	5.8-7.2	0.75
Prevalence of unmet need for GP due to cost, adult	Percentage of adults (15+) with a medical problem who did not visit a General Practitioner due to cost in the past 12 months.	Ministry of Health	With increasing poverty, citizens may be unable to afford to pay for basic general practitioner services.	6.0	13.6-14.5	0.75
Prevalence of adequate vegetable and fruit intake, adult	Percentage of adults (15+) meeting fruit and vegetable guidelines, defined as at least three servings of vegetables and two servings of fruit a day.	Ministry of Health	Increased fruit and vegetable intake may reduce risk of some non-communicable diseases and certain cancers; therefore, increased intake should enhance health status.	7.0	38.8-44.5	0.5
Prevalence of breakfasting at home less than 5 days, child	Percentage of children (2-14) eating breakfast at home less than 5 days in the past week.	Ministry of Health	Children who miss breakfast tend to have poorer diet, higher body mass index, and potentially increase in cardiovascular risk.	7.0	7.4-10.3	0.75
Prevalence of emotional/behavioural problems, child	Percentage of children (2-14) who have ever been diagnosed with depression, anxiety disorder, attention deficit disorder, or attention deficit hyperactivity disorder.	Ministry of Health	Mental health contributes to overall health. This information relates to the negative aspects of mental health, specifically in children.	7	1.8-4.9	0.5
Prevalence of diabetes, adult	Percentage of adults (15+) who have ever been diagnosed with diabetes, excluding diabetes during pregnancy.	Ministry of Health	Type 2 diabetes is a growing worldwide lifestyle disease that indicates poor nutrition and/or poor physical activity.	7.0	5.1-6.1	0.5
Prevalence of depression, child	Percentage of children (2-14) who have ever been diagnosed with depression.	Ministry of Health	Mental health contributes to overall health. This information relates to the negative aspects of mental health, specifically in children.	7.0	0.2-1.1	0.5
Prevalence of good or better parent-rated health, child	Percentage of children (0-14) with 'excellent', 'very good' or 'good' health as rated by their parents.	Ministry of Health	Mental health contributes to overall health. Here we present information on how parents view the health status of their children.	7.0	97.6-98.4	0.75
Prevalence of unfulfilled prescriptions due to cost, child	Percentage of children (0-14) with unfilled prescriptions due to cost.	Ministry of Health	Maori and Pacific adults and children were more than 2 times as likely to not have collected a prescription due to cost than non-Pacific and non-Maori adults and children respectively, after adjusting for age and sex differences.	6.0	3.8-6.6	0.75
Prevalence of unmet need to after hours care due to cost, child	Percentage of children (0-14) with an after hours medical problem who did not visit an after-hours medical centre due to cost in the past 12 months.	Ministry of Health	With increasing poverty, citizens may be unable to afford to pay for basic after-hours health care. This measure specifically reports data on children.	6.0	2.6-4.5	0.75
Prevalence of unmet need for GP due to cost, child	Percentage of children (0-14) with a medical problem who did not visit a General Practitioner due to cost in the past 12 months.	Ministry of Health	With increasing poverty, citizens may be unable to afford to pay for basic general practitioner services. This measure specifically reports data on children.	6.0	3.0-6.5	0.75
Prevalence of adequate vegetable and fruit intake, child	Percentage of children (2-14) meeting fruit and vegetable guidelines, defined as 2-4 years - at least two servings of vegetables and two servings of fruit a day; 5-14 years - 2-4 at least three servings of vegetables and two servings of fruit a day.	Ministry of Health	Children living in poverty typically consume less fruit and vegetables.	6.0	48.5-55.5	0.75
Prevalence of healthy weight, child	Percentage of children (2-14) with a healthy weight defined as a BMI of 18.5-24.9.	Ministry of Health	Children living in the most socio-economically deprived neighbourhoods were 2.5 times as likely to be obese as children living in the least deprived neighbourhoods, after adjusting for age, sex and ethnic differences	7.0	62.5-67.7	0.75
Rate of suicides	Suicides per 100,000 population.	Coronial Services of New Zealand (New Zealand Ministry of Justice), Statistics New Zealand	Suicide rates based on coroners findings are a sign of the mental health and social wellbeing of the population.	34	10.3-15.2	0.25
Prevalence of problem gambling interventions	Percentage of the population who have received problem gambling treatment services.	Ministry of Health, Statistics New Zealand	Problem gambling harm is experienced by the gambler and also those close to the gambler (PGFNZ factsheet, "Children of problem gamblers", July 2018). Problem gambling is associated with anxiety, depression, other mental disorders, and substance abuse (PGFNZ factsheet, "Problem gambling and mental health").	13.0	0.0-0.0	0.75

Table A.4: Health Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Tertiary education participation	The number of enrolments in tertiary education in a calendar year as a percentage of population aged 15 and over.	Ministry of Education	Tertiary education can help break the poverty cycle as better-educated individuals are likely earn more and contribute towards a better society for all.	23	7.3-13.5	1.0
Education expenditure: GDP	Education expenditure as a percentage of GDP.	Ministry of Education	Education provides both private and social returns to a society. There is a positive relationship between mean educational output (PISA scores) and education expenditure (%GDP) (Source: OECD PISA).	20	4.8-6.1	2.0
Education expenditure: government expenses	Education expenditure as percentage of total government expenses.	Ministry of Education	Spending a larger share of income on education shows a governments willingness to prioritise education within its budget.	20	15.4-20.1	2.0
Tertiary loan as a percentage of income	Median amount borrowed (tertiary loan) as percentage of median income after housing costs.	Ministry of Education	Is the added cost of tertiary education reflected in higher earning potential and improvements in social contributions?	17	23.3-28.0	1.0
Tertiary loan leaving balance as a percentage of income	Inflation adjusted median tertiary loan balance on leaving study as a percentage of median income after housing costs.	Ministry of Education	How well are graduates able to repay their loans?	16	35.7-45.2	1.5
University fees to income ratio	Average university fee as a ratio of mean weekly earnings for a full-time employee.	Ministry of Education	The extent to which university fees enhance earning potential relative to a) polytechnic fees and b) wananga fees.	17	5.0-6.2	1.5
Polytechnic fees to income ratio	Average polytechnic fee as ratio of mean weekly earnings for a full-time employee.	Ministry of Education	Polytechnics provide more applied and vocational tertiary education relative to universities; vocational courses offer non-academic students the opportunity to better contribute to society with enhanced skill-set.	17	3.0-5.4	1.5
Wananga fees to income ratio	Average wananga fee as ratio of mean weekly earnings for a full-time employee.	Ministry of Education	The extent to which this type of tertiary education enhances earning potential, and contribution to society, specifically for Māori.	11	0.4-3.9	1.5
Degree earnings premium: hourly	Median hourly earnings premium for those with a bachelors degree or higher as their highest qualification, compared to people with no qualification.	Ministry of Education	Tertiary education provides better-educated and higher-income citizens. However, if the premium becomes too high, then this may indicate inequalities in education; if the earning premium is too low, then it devalues the necessity for tertiary education. In particular, if personal opportunity costs of going education rise in comparison to the downstream benefits, this will act as a disincentive for tertiary enrolments.	11	55.3-67.3	1.0
Diploma/certificate earnings premium: hourly	Median hourly earnings premium for those with a diploma or certificate as their highest qualification, compared to people with no qualification.	Ministry of Education	Tertiary education provides better-educated and higher-income citizens. However, if the premium becomes too high, then this may indicate inequalities in education; if the earning premium is too low, then it devalues the necessity for tertiary education. In particular, if personal opportunity costs of ongoing education rise in comparison to the downstream benefits, this will act as a disincentive for tertiary enrolments.	11	20.1-37.7	1.0
School earnings premium: hourly	Median hourly earnings premium for those with a school qualification as their highest qualification, compared to people with no qualification.	Ministry of Education	A basic level of education is critical for a well-functioning society, both in terms of private (e.g. earning) and social (e.g. volunteering) returns.	11	1.7-7.4	1.0
Degree earnings premium: weekly	Median weekly earnings premium for those with a bachelors degree or higher as their highest qualification, compared to people with no qualification.	Ministry of Education	Weekly premium is included in addition to hourly premium as the two may not necessarily correlate. For example, if a bachelors degree leads to more full-time work, this may be reflected in an improvement in average weekly incomes but not average hourly earnings. Again, this will also indicate personal incentives to continue/complete education.	11	135.9-162.4	1.0
Diploma/certificate earnings premium: weekly	Median weekly earnings premium for those with a diploma or certificate as their highest qualification, compared to people with no qualification.	Ministry of Education	Weekly premium is included in addition to hourly premium, as the two may not necessarily correlate. For example, if a diploma or certificate leads to more full-time work, this may be reflected in an improvement in average weekly incomes but not average hourly earnings. Again, this will also indicate personal incentives to continue/complete education.	11	92.3-111.7	1.0
School earnings premium: weekly	Median weekly earnings premium for those with a school qualification as their highest qualification, compared to people with no qualification.	Ministry of Education	Weekly premium is included in addition to hourly premium, as the two may not necessarily correlate. For example, if completing secondary school leads to more full-time work, this may be reflected in an improvement in average weekly incomes but not average hourly earnings. Again, this will also indicate personal incentives to continue/complete education.	11	0.3-16.5	1.0

Table A.5: Education Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Unemployment rate	Percentage unemployment in labour force.	Statistics New Zealand	The unemployment rate shows how many people are unable to find employment and therefore are likely not being able to meet their needs or contribute to wealth creation through paid employment.	32	3.6-10.7	2.0
Unemployment rate, 60-64	Percentage unemployment in labour force, 60 - 64 age group.	Statistics New Zealand	Specifically looks at an age group that is close to the retirement age. This age group might have great difficulties finding employment.	32	1.2-5.4	0.75
Unemployment rate, 65+	Percentage unemployment in labour force, 65+ age group.	Statistics New Zealand	An indicator of people who could retire but still would like to be in some kind of employment.	32	1.0-3.4	0.75
Underemployment rate	Percentage underemployment in labour force.	Statistics New Zealand	Shows how many people are employed at less than full-time, regular jobs or jobs inadequate with respect to their training or economic needs.	14	2.8-4.4	2.0
Percentage of employees working long hours	Percentage of employees usually working 50 or more hours a week.	OECD	An indicator of the number of people that have to work long hours to meet economic needs. This group might not receive a fair share of the wealth created in New Zealand.	12	13.3-15.7	0.5
Labour market insecurity	Average expected monetary loss associated with becoming and staying unemployed, as a share of previous earnings.	OECD	An indicator of how difficult it might be for someone to change into a more preferred occupation.	10	3.2-5.9	1.5
Long-term unemployment rate	Percentage of long-term unemployed in labour force.	OECD	Shows how many people have been unable to find employment for an extended period of time.	32	0.2-3.5	1.5
Percentage of youth NEET	Percent of population between ages 15 and 29 who are not in employment, nor education nor training (NEET).	Statistics New Zealand	People in this group would struggle to meet their basic needs.	14	10.7-14.1	2.0
Percentage of workforce on low pay, OECD definition	The estimated percentage of the total workforce on low pay as defined by OECD (66% of median income).	OECD	Shows how many young people are unable to find employment and are not in training. Like the 60-65 and 65+ group, this group might not have accumulated reserves they can draw on and might not be able to meet their needs.	21	11.2-14.6	1.0
Percentage of workforce on low pay, relative to minimum wage	The estimated percentage of total workforce on low pay relative to minimum wage (120% of minimum wage).	Ministry of Business, Innovation and Employment Living Wage Aotearoa New Zealand, Ministry of Business, Innovation and Employment New Zealand Productivity Commission	Being on a low pay, this group might struggle to meet basic needs.	4	17.9-24.9	1.0
Minimum to living wage gap	Magnitude of the workforce affected by the gap between the minimum wage and the living wage (minimum wage rate divided by living wage rate, multiplied by the percentage of the workforce on the minimum wage).	Ministry of Business, Innovation and Employment New Zealand Productivity Commission	Being on a low pay relative to the minimum wage, this group might struggle to meet basic needs.	4	1.8-2.5	1.0
Labour share of income	Labour share of income in MS-16 industries (16 measured sectors: Agriculture, Electricity, Gas, Water and Waste Services, Construction, Wholesale Trade, Retail Trade, Accommodation and Food Services, Transport, Postal and Warehousing, Information, Media, and Telecommunications, Financial and Insurance Services, Rental, Hiring, and Real Estate, Professional, Scientific and Technical Services, Administrative and Support Services, Arts and Recreation Services, and Other Services).	Ministry of Business, Innovation and Employment New Zealand Productivity Commission	Indication of how many people earn less than the living wage which suggests that people in this group are unable to meet their basic needs.	21	0.5-0.6	2.0
Labour productivity/real product wages ratio	Ratio of labour productivity (indexed) to real product wages (indexed) in MS-16 industries.	New Zealand Productivity Commission	A measure that shows how much of the income generated from production is spent on labour. It shows how much of the wealth created by the workforce is shared with the workforce.	21	1.0-1.1	2.0

Table A.6: Employment Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Percentage of households spending above 30% of income on rental	Percentage of households nationally spending above 30% of income on housing rental.	Ministry of Business, Innovation and Employment	This figure does not imply that spending 30% of household income is or is not affordable. The figure does however quantify trends towards potential hardship due to higher housing costs.	15.0	0.3-0.3	1.5
Percentage of households spending above 30% of income on housing	Percentage of households nationally spending above 30% of income on housing costs.	Ministry of Business, Innovation and Employment	This figure does not imply that spending 30% of household income is or is not affordable. The figure does however quantify trends towards potential hardship due to higher housing costs.	15.0	0.4-0.6	1.5
House affordability: rent	The housing affordability measure (HAM) for potential first home buyers, compares their income after housing costs in different regions, to median national after housing cost income of all households. The HAM for renters, compares their income after housing costs in different regions, to median national after housing cost income of all households.	Ministry of Business, Innovation and Employment	The measure is particularly relevant for first home buyers.	15.0	0.6-0.7	2.0
House affordability: purchase	The number of owner-occupied homes as a percentage of total number of private dwellings.	Ministry of Business, Innovation and Employment	For those unable or unwilling to purchase a home, the affordability of renting represents a key measure of potential changes to material hardship trends.	15.0	0.8-0.8	2.0
Percentage of home ownership	Percentage of people in the population that are severely housing deprived.	Statistics New Zealand	Historically, New Zealanders have tend to prefer owning a home than renting. This measure quantifies to some degree if this aspiration is being met.	27.0	62.9-73.3	1.5
Percentage of homelessness in population	Percentage of priority A state housing applicants in the population.	Statistics New Zealand	This figure captures the extent of evolving hardship.	3.0	0.7-0.9	0.5
Percentage of Priority A state housing applicants in population	Percentage of priority B state housing applicants in the population.	Housing New Zealand, Statistics New Zealand	This figure captures the extent of evolving hardship.	16.0	0.0-0.1	0.75
Percentage of Priority B state housing applicants in population	Household debt servicing as percentage of nominal disposable income.	Housing New Zealand, Statistics New Zealand	This figure captures the extent of evolving hardship.	16.0	0.2-0.4	0.75
Percentage of disposable income spent on household debt	This measure is defined as the ratio between median house price and median annual household income.	Reserve Bank of New Zealand interest.co.nz	The measure is particularly relevant for first home buyers.	20.0	7.7-13.8	1.0
Household median multiples			The house-price-to-income multiple is an internationally recognised of housing affordability measure. It is endorsed and used by both the United Nations and the World Bank.	18.0	3.2-6.2	1.0

Table A.7: Housing Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Percentage of population in remand	Total prisoners in remand as percent of population	Statistics New Zealand	Links have been made between inequality and rates of imprisonment	19	0.2-0.3	1.5
Percentage of population sentenced	Total sentenced prisoners as percent of population	Statistics New Zealand	Links have been made between inequality and rates of imprisonment	19	0.2-0.2	1.5
Percentage of population post-sentence	Total post sentence offenders as percent of population	Statistics New Zealand	Links have been made between inequality and rates of imprisonment	15	0.1-0.2	1.5
Incidence of crime victimisation	Incidence of violent crime as a percent of population	Statistics New Zealand, New Zealand Police	Links have been made between inequality and violent crime, in particular, homicide.	24	5.1-8.3	2.0
Rate of murder and homicide	Incidence of murders and homicides per one million population	New Zealand Police	Links have been made between inequality and violent crime, in particular, homicide.	24	7.3-17.4	1.0

Table A.8: Safety and Security Dimension Indicators

Name	Description	Source	Rationale	No. of values	Data value range	Weight
Gender inadequacy of income difference	Difference between female and male survey percentages (female percentage less male percentage) of adequacy of income to meet everyday needs as being 'not enough money' or 'only just enough money'.	Statistics New Zealand	"Women earn lower incomes and live longer on average and are more likely to care for dependents than men. As such, they may experience income inadequacy at higher rates than men, sharing less in financial prosperity. In addition, these factors may place women in a more precarious financial situation."	5	1.1-3.9	0.75
Housing tenure inadequacy of income difference	Difference between renter and home-owner survey percentages (renter percentage less home owner percentage) of adequacy of income to meet everyday needs as being 'not enough money' or 'only just enough money'.	Statistics New Zealand	"Renters are more likely to earn lower incomes than home-owners and are more vulnerable to housing poverty. As such, they may experience income inadequacy at higher rates than home-owners and sharing less in financial prosperity."	5	19.1-23.5	0.75
Long-term migrant to population inadequacy of income difference	Difference between long-term migrant and population survey percentages (long-term migrant percentage less population percentage) of adequacy of income to meet everyday needs as being 'not enough money' or 'only just enough money'.	Statistics New Zealand	A financial indication of whether long-term migrants share in financial prosperity to the same level as the rest of the population.	5	2.8-5.7	0.75
Māori to population inadequacy of income difference	Difference between Māori and population survey percentages (Māori percentage less population percentage) of adequacy of income to meet everyday needs as being 'not enough money' or 'only just enough money'.	Statistics New Zealand	"A financial indication of whether Māori share in financial prosperity to the same level as the rest of the population. Māori earn lower incomes on average than Pākehā (HES 2017 report, p.139), are more likely to experience housing poverty and are more likely to be unemployed than the rest of the population."	5	9.3-15.9	0.75
Low income gender difference	"Difference in percentages between females and males (female percentage less male percentage) and 15 years or older, in low income households"	Ministry of Social Development	"A measure of inequities of financial hardship, given potential increased exposure to risk of this on basis of gender."	18	0.0-3.0	1.0
Gender pay gap	Gender earnings gap	Statistics New Zealand	"A measure of the difference in earnings on the basis of sex. The indicator does not attempt to control for occupation choices, qualifications, work experience or the different distributions in full-time or part-time work amongst the sexes."	21	9.1-16.2	0.5

Table A.9: General Equality Dimension Indicators