Accounting for social difference when measuring cultural diversity

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David C Maré & Jacques Poot

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Author contact details

David C Maré

Motu Economic and Public Policy Research Trust

PO Box 24390, Wellington, NEW ZEALAND

dave.mare@motu.org.nz

Jacques Poot

Te Ngira: Institute for Population Research, University of Waikato

Private Bag 3105, Hamilton 3240, NEW ZEALAND

jacques.poot@waikato.ac.nz

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Motu Economic and Public Policy Research

PO Box 24390	info@motu.org.nz	+64 4 9394250
Wellington	www.motu.org.nz	
New Zealand		

Abstract

In this paper we introduce a measure of cultural diversity that takes 'social difference' between country of birth and ethnic groups into account. We measure social difference using exploratory factor analysis of subjective identity, attitude and value responses in Aotearoa New Zealand's 2016 General Social Survey. We examine the level of, and change in, our social difference-based measure of cultural diversity in 31 urban areas between 1976 and 2018, using census data. We compare these patterns with those derived from a standard fractionalisation measure of diversity based on population composition by country of birth and ethnicity. We find that the two diversity measures are highly correlated across the urban areas. Diversity increased everywhere between 1976 and 2018, whether social difference is taken into account or not. However, the social difference-based measure increased much faster than the standard measure in all but one of the urban areas. This suggests that growth in the fractionalisation measure of diversity is likely to have underestimated the trend in experienced social difference. Both measures also show evidence of spatial convergence in diversity: urban areas with low diversity in 1976 – which tended to be in the South Island – exhibited faster increases. Population diversity increased strikingly in Queenstown, which was the 19th most diverse urban area in 1976, in terms of social difference, but second only to Auckland in 2018.

JEL codes

J15; R23; Z13

Keywords

Cultural diversity; social difference; fractionalisation; New Zealand; urban

Summary haiku

High diversity:

look at social difference

not just group sizes

Table of Contents

Tables and Figures

Appendix Tables and Figures

1   Introduction

There are many ways to quantify the socio-demographic diversity of the population of a country or area – surveyed by, for example, Nijkamp and Poot (2015). One of the simplest, and most easily interpretable, of these measures is fractionalisation: the probability that two randomly selected individuals belong to two different groups. In this paper we focus on population diversity in Aotearoa New Zealand. With a relatively large proportion of the population foreign born, particularly in the metropolitan areas, and a relatively large tangata whenua, i.e. Māori, population among the domestically born, the population of Aotearoa New Zealand is highly diverse by international standards. There is an extensive literature on New Zealand's socio-demographic diversity, with findings of recent years summarised in Stone et al. (2021). Table 1 shows that Auckland is New Zealand's most diverse city, whether the fractionalisation measure is based on ethnic diversity, country of birth diversity, language diversity, or diversity of religion. The table also shows the generally lower population diversity in the South Island. The least diverse city in terms of country of birth diversity and language diversity is Invercargill; with diversity of religion lowest in Dunedin and ethnic diversity lowest in Nelson.

However, fractionalisation does not convey how diversity is experienced. For example, if an area is home to people from various countries of birth that are culturally very similar, fractionalisation may signal more diversity than is actually experienced. In this paper we examine therefore what the consequences are, for diversity measurement, of taking into account that a city, or any other area, may not only be home to many different groups, but also to groups that differ from each other in ways such as their behaviours, attitudes, or values – differences that we refer to broadly as 'social difference'. Our motivation is to identify a measure of socio-demographic diversity that captures the both the likelihood and the quality of interactions and communication between people of different groups within New Zealand cities. This will support further analysis of the contribution that such diversity might make to a range of social and economic outcomes. Diversity measures based solely on local population proportions for categories defined by ethnicity, country of birth, language or religion may be misleading because being in a different category may be only a weak indicator of the likelihood or quality of interactions. We therefore derive a measure that better captures the degree of diversity that is encountered in inter-group interactions, based on indicators of social difference.

Hence we present in this paper a new social difference-based measure of diversity for New Zealand cities. Using data from all successive population censuses between 1976 and 2018, we disaggregate the population in each of 31 urban areas in terms of country of birth and, for those

born in Aotearoa New Zealand, in terms of ethnicity. To quantify social difference we use data from the 2016 General Social Survey (GSS) on associational membership, acceptance of diversity, cultural identity, cultural participation, language, political participation, social connectedness, social identity and trust. This enables us to calculate a group-size-weighted average social difference in each of the urban areas that we use to examine the level and growth of this measure of socio-demographic diversity across New Zealand urban areas. For comparison, we also calculate cultural fractionalisation in each census year and urban area.

We find that the two diversity measures are highly correlated across urban areas. Diversity increased everywhere between 1976 and 2018, whether social difference is taken into account or not. However, the social difference-based measure increased much faster than the standard measure in all but one of the urban areas. This suggests that growth in the fractionalisation measure of diversity is likely to have underestimated the trend in experienced social difference. Both measures also show evidence of spatial convergence in diversity: urban areas with low diversity in 1976 exhibited faster increases.

We briefly discuss in Section 2 how our study fits within the existing literature on diversity measurement. Following a description of the data in Section 3 and of the methods we adopt in Section 4, Section 5 provides our findings. The final section discusses strengths, limitations, and potential applications of our proposed measure.

2 Related studies

Our study contributes to a well-established literature that measures socio-demographic diversity at the country or subnational level. The most common and most easily implemented measures are those based on population proportions belonging to groups defined by classifications that are readily available from statistical sources. New Zealand diversity studies have generally focused on Auckland, and have restricted attention to composition by ethnicity (Grbic et al., 2010; Johnston et al., 2011) or by birthplace (Maré et al., 2016; Maré & Poot, 2019b; Mondal et al., 2021). Mondal et al. (2021) also document Auckland residential diversity by a wider range of attributes (age, income, occupation, and education), while Maré et al. (2019b) consider, besides diversity defined for birthplace and ethnicity, also religious affiliation.

Ethnicity and birthplace are the most commonly used categories for cultural diversity measurement in the international literature, given the wide availability of population statistics on these two characteristics. Classification-based diversity measures have also been constructed internationally on the basis of other population attributes such as language (Desmet et al., 2012; Eberle et al., 2020) or religion (Hudson & Taylor, 1972; Reynal-Querol, 2002).

The use of birthplace fractionalisation, i.e. a measure of the probability that two randomly selected persons were born in different countries, was popularised in cross-country studies by Mauro (1995), and adopted by Ottaviano and Peri (2006) in their influential study of cultural diversity and economic performance in US cities. Ottaviano and Peri acknowledge that cultural diversity has many dimensions other than national origin, such as: ethnicity, language, identity, and religion. However, they argue that, for their study of US cities, migration flows of foreign-born people represent the primary driver of diversity change.

New Zealand has, like the US, considerable birthplace diversity (and 27 percent of the New Zealand population is foreign born, as compared with 15 percent in the US). However, the presence of a large indigenous population (16 percent of the population identified with Māori ethnicity in the 2018 census) and the, at least partial, transmission of cultural identity to subsequent generations (e.g., Mondal et al., 2020) imply that a measure of cultural diversity in Aotearoa New Zealand should account for both country of birth and self-identification of ethnicity. However, as noted in the introduction, the primary focus of this paper is to take the extent of intergroup differences into account – such as the linguistic distance between languages that are being spoken by members of two groups that interact with each other.

There are three broad approaches to calculating the degree of inter-group difference. The first approach relies on measuring an observable characteristic that differs across groups, such as language or genetics. The second approach measures the frequency of actual or potential interactions between groups. The third approach focuses on group-level differences in attitudes, values, and beliefs, as captured in social surveys.

Taking the first approach, Fearon (2003) derives a measure of country-level ethnic diversity, using the similarity of languages to capture inter-ethnic differences (see also Greenberg, 1956, for a pioneering contribution). Ginsburgh & Weber (2020, s 3.2.1) document a variety of approaches to estimating the similarity between languages that can be used in this way, including measures based on historical patterns of language development, and measures based on similarity of words or sounds. Similarly, inter-group difference can be estimated on the basis of genetic variation. Genetic variation is captured as allele shares for an identified set of genes. From this, it is possible to derive measures of genetic difference within and between different populations (Li et al., 2008), which capture the probability that two randomly chosen individuals are genetically different. Ashraf & Galor (2013) uses this approach to develop measures of genetic diversity within countries, based on the genetic variation within and between resident ethnic groups. Spolaore and Wacziarg (2009) use the same underlying data to derive a measure of genetic distance between countries.

The second approach, i.e. the one that is actual or potential interaction-based, includes standard measures of inter-group 'exposure' (Massey & Denton, 1988; Nijkamp & Poot, 2015). These are commonly calculated under the assumption that the probability of interactions occurring is related to the population composition of residents in a local (usually bounded) area. As noted previously, the standard fractionalisation measure of local diversity is then just the probability that two randomly chosen individuals residing in the same local area are from different groups. Reardon et al. (2008) have generalised this approach to allow for variation in the spatial extent of interactions. More generally, interactions do not occur only in or around residential locations. 'Social interaction potential' approaches aim to capture interaction possibilities on the basis of people being in the same place at the same time (Hägerstrand, 1970). These approaches are quite demanding of data, and have been implemented by using space-time surveys (e.g., Park & Kwan, 2018), in transport modelling (Farber et al., 2015), and more recently, by using information on mobile phone locations (e.g., Östh et al., 2018). Analysis of social media friendship networks and phone calls has been used to study exposure based on *actual* rather than *potential* interactions; applied, for instance, to interactions between racial groups (Barker, 2012) or different income groups (Galiana et al., 2018).

Our analysis in the current paper follows the third approach of measuring diversity in that we take group-level variation in responses to social survey questions into account to capture the degree of difference between populations. We restrict attention to potential interactions that could occur in local residential areas, and complement this with measures of differences in survey responses as a proxy for the nature of interactions. We posit that interactions between people with very different views represent a greater exposure to diversity than interactions within homogeneous groups. We do not examine in this paper the desirability of having more diverse interactions, or whether diversity generates positive or negative spillovers (but see Ozgen, 2021, for a recent survey).

Our approach draws on Hofstede's (1991, 2011) pioneering approach to quantifying cross-cultural differences across organisations and nations. Hofstede et al. (2010) identify six dimensions along which cultures differ. We follow the general approach of identifying dimensions of difference, but do not replicate the specific dimensions that Hofstede identifies.[1] Instead, we use dimensions that can be quantified by means of data from New Zealand's GSS. Our focus on the measurement of diversity draws on a literature which has used Hofstede's 'dimensional paradigm' as the basis for measuring cultural diversity. For example, Ashraf and

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[1] The six dimensions identified by Hofstede et al. (2010) are: power distance; uncertainty avoidance; individualism versus collectivism; masculinity versus femininity; long-term versus short-term orientation; and indulgence versus restraint.

Galor (2011) measure cultural diversity based on two dimensions of cultural variation that were previously identified by Ingelhart and Baker (2000) using factor analysis of World Values Survey (WVS) data (the dimensions are "traditional versus secular rational" and "survival versus self-expression"). Ashraf and Galor use cluster analysis to group respondents into what they refer to as cultural groups and to obtain a measure of how different groups are from each other. From this, they derive a difference-weighted within-country diversity index for each of 139 countries. Beugelsdijk et al. (2019) analyse similar data from the European Values Survey (EVS), but they measure diversity based on question-specific fractionalisation of responses rather than developing a metric of the degree of difference in responses.

While taking a similar approach to measuring social difference in this paper, we do not focus on the diversity of survey responses per se. Instead, we use inter-group average differences in response patterns to parameterise the difference between predefined ethnicity/ birthplace groups. We do this to gauge whether difference-based diversity provides a different (and potentially more meaningful) picture of the relative diversity of New Zealand urban areas.

3   Data

We use data from the 2016 New Zealand General Social Survey (GSS) to identify differences between specific country of birth and ethnicity groups. We refer to the differences rather loosely as 'social difference' as they include elements of differences in identity, attitudes, values, and culture. The specific questions that we use, and the approach to coding and combining them, is described below in section 4.1. The 2016 GSS was chosen because the Supplement to the GSS in that year focused on civic and cultural engagement, which we draw on for some of our social difference measures.

The choice of countries and ethnicity groupings is somewhat limited by the sample size of the GSS. We identify 34 separate groups, based on aggregations of more detailed categories available in the GSS. Foreign-born respondents are grouped into 27 categories, capturing country of birth. The largest groups are identified by their specific country of birth, with smaller groups assigned to categories based on geographic region of birth. New Zealand-born respondents are classified separately based on reported ethnicity. As in the population census, individual respondents in the GSS may identify with multiple ethnicities. However, diversity measures such as the fractionalisation index are based on probability concepts in which each individual may belong to one and only one group. Hence we treat each combination of reported ethnicities as a separate category. For example, someone identifying as both European and

Māori would be classified as 'European-Māori'.[2] We aggregate the responses of the NZ born persons into 7 distinct categories, including separate residual categories for 'other single ethnicity' and 'other multiple ethnicities'. We accept that some of the foreign-born respondents may identify with multiple ethnicities too, but the GSS sample size is such that to define such groups is not feasible due to the associated sampling errors. The resulting 34 country of birth/ethnicity categories are shown in Table 2, together with the number of observations and the estimated population sizes, based on GSS sample weights. We can see from Table 1 that the five largest groups are the NZ born with European ethnicity (52.5 percent), NZ born with Māori ethnicity (7.0 percent), NZ born with both European and Māori ethnicity (5.2 percent) , England born (4.0 percent) and India born (2.7 percent). The smallest represented group consists of those born in Southern and Eastern Africa (not further defined), who account for about 0.4 percent.

When we estimate diversity for each main and secondary urban area, we use population counts from each of the 1976 to 2018 Census of Population and Dwellings, re-coded to the same country-ethnicity groupings reported in Table 2. The population counts are calculated for the usually-resident adult (15 years of age and over) population in each census year.

4 Measurement of diversity

Recent empirical studies of diversity in New Zealand have relied on information on population shares belonging to different country of birth or ethnic groups. The degree of diversity has been captured by fractionalisation measures (Maré & Poot, 2019a, 2019b) or entropy measures (Mondal et al., 2021). Each of these approaches treats people from different countries of birth or ethnic groups as different. In the current paper, we compare fractionalisation-based measures of diversity with variants that allow for degrees of difference between different groups. As noted previously, the standard fractionalisation measure captures the probability that a meeting between two randomly chosen residents involves people from different groups. Difference-based fractionalisation captures the average degree of difference between two residents meeting randomly.

The standard fractionalisation measure of diversity is calculated as:

$$F = 1 - \sum_g (p_g)^2 \qquad (1)$$
$$= 1 - p'p$$

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[2] The population-weighted GSS responses suggest that 9.75 percent of the NZ born population in 2016 identified with two or more ethnicities.

where p_g is the proportion of the population that belongs to group 'g'. The index takes a minimum value of 0 when the entire population belongs to a single group $(p_g = 1)$, and maximal diversity is $F = 1 - \frac{1}{G}$, which occurs when each of G groups accounts for an equal proportion of the population $\left(p_g = \frac{1}{G} \text{ for any } g\right)$. Maximum fractionalisation for our analysis of 34 country/ ethnicity categories is therefore $1 - \frac{1}{34} = 0.97$. The second line of equation (1) expresses the formula in matrix notation, where p is a column vector of population shares.

A related diversity measure, which reflects the fact that some pairs of groups are more similar to each other than others, is a difference-based fractionalisation index (Greenberg, 1956; Nijkamp & Poot, 2015). This measure captures that idea that a given level of fractionalisation represents a lower level of diversity when the groups are similar to each other. Difference based fractionalisation, which we refer to as 'social difference' is calculated as:

$$F^D = \sum_h \sum_g p_g p_h \sigma_{gh} \qquad (2)$$
$$= p' \Sigma p$$

where σ_{gh} is a measure of the difference between groups *g* and *h*. Hence $\sigma_{gg} = 0$. In matrix notation, Σ is a square matrix with elements σ_{gh}. Note also that Σ is symmetric: $\sigma_{gh} = \sigma_{hg}$. The difference between two groups is measured objectively and we cannot take into account that one of the two groups may subjectively gauge the difference to be larger or smaller than the other. In the next sub-section we describe the calculation of this social difference / distance matrix.

4.1   Calculating 'social difference'

We estimate the pairwise difference between any two country/ethnicity groups based on how different their average pattern of responses were to various questions asked in the 2016 GSS and its Supplement. As noted in the introduction, we combine responses to questions across the following broad domains: associational membership, acceptance of diversity, cultural identity, cultural participation, language, political participation, social connectedness, social identity, and trust. The selected questions are a pragmatic mix of identity, behaviour, values, and attitudes. They are chosen to capture a range of possible differences, and are not intended to represent any particular conceptual construct such as culture, values, or identity. The GSS includes a broader range of questions than those that are included in our analysis. Our choice of questions was guided in part by the quality of responses – questions with low item-response rates and/or high proportions of 'do not know' responses were not included.

Appendix Table 1 lists the GSS questions that were used in our analysis. We use exploratory factor analysis (see e.g. Joliffe and Morgan, 1992, for an introduction) to capture the main patterns of variation in responses across all of these questions. We first calculate a matrix of correlations between the responses for each pair of questions. Where the number of response categories is 10 or fewer, polychoric correlations are calculated (e.g. Olsson, 1979). Polychoric correlations are appropriate for measuring correlations between ordinal measures, using the assumption that responses for each pair of questions follow an underlying bivariate normal distribution. Based on the resulting correlation matrix, we identify eight factors, using the iterated principal factor method. Appendix Table 2 shows the rotated factor loadings on each question for the eight factors, based on a varimax (orthogonal) rotation of the Kaiser-normalised matrix (Kaiser, 1958). We have assigned subjective names to each of the eight factors, reflecting the questions that have the highest weightings for the factor (as indicated by the factor loadings in bold type). The eight factors, in descending order of importance in accounting for variation in response patterns, relate to: 1) acceptance of diversity; 2) trust; 3) attitudes to *te reo*; 4) political participation; 5) social connections with friends; 6) social connections with family; 7) local sense of identity with neighbourhood, country or region; and 8) active participation in sports or other club membership.

Each factor is normalised to have a mean of zero and a variance of 1 across the New Zealand population (using the GSS population weights). We calculated the median factor score for each factor separately by country of birth/ ethnicity group.[3] These scores are shown in Table 2. For example, The Americas (nfd) scores the highest (0.94) on 'acceptance of diversity', Philippines scores the highest (1.31) on trust, while NZ born, Other Ethnicity scores the lowest (-0.43) on 'language'.

The social difference between two groups is calculated as the (Euclidean) distance between the two rows that contain the median scores on each of these eight factors for the two groups. The matrix of pair-wise differences calculated in this way is used as the (symmetric) difference/distance matrix Σ in equation (2) to calculate group-share weighted average social difference in each urban area. The resulting social difference measure F^D is bounded below by zero (when all groups have the same vector of median factor scores across the eight factors), and is unbounded above. We therefore normalise F^D so that it takes on values between zero and one. We achieve this rescaled social difference score $\tilde{F}^D$ by applying a monotonic transformation to F^D that uses a scaled half-normal cumulative density function:

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[3] The use of median scores rather than means avoids that the scores and the between-group distances become sensitive to outliers and non-normal distributions in the data.

$$\tilde{F}^D = 2 * \Phi(F^D) - 1 \tag{3}$$

where $\Phi()$ is the standard normal cumulative density function.

Figure 1 provides a visual summary of the social difference between the different country/ethnicity groups. Groups that are located away from other groups do so because they have distinctive patterns of responses to *GSS* questions, as demonstrated by relatively high or relatively low factor scores on one or more factors. For instance, NZ born residents identifying Māori as their sole ethnicity report relatively lower levels of trust than other groups, and are more likely to respond positively to questions about the use of and support for te reo Māori. In contrast, respondents born in the Philippines report relatively high levels of trust, as noted above, which contributes to their being positioned away from Māori in Figure 1. USA-born respondents report unusually high participation in political activities, contributing to their positioning at one edge of Figure 1. Generally, we see some geographical clustering with the distances between groups from the same continent being closer than the distances between groups from different continents. However, we attach no subjective interpretation to high or low scores on any of the dimensions. We aim to identify only how different groups are from each other.

5   Results

Table 3 shows the values of the two measures of diversity in 2018, the level of change in diversity by both measures between 1976 and 2016, as well as the relative growth. The urban areas are listed in descending order of $\tilde{F}^D$. It should be noted that, although both measures are bounded between zero and one, their values are not directly comparable. They are conceptually different – as discussed above. However, we can gauge where each urban area sits with respect to either measure in relative terms. Additionally, it is meaningful to interpret the relative percentage changes between 1976 and 2018 and to assess the extent to which there has been conditional divergence or convergence in terms of a possible relationship between the level of diversity in 1976 and the rate of change between 1976 and 2018.

5.1   Relative diversity

Relative diversity across New Zealand urban areas looks similar whether based on a fractionalisation or social difference-based measure. As shown in Table 3, Auckland was the most diverse urban area in 2018, whichever measure is used ($\tilde{F}^D = 0.683; F = 0.876$). The two most diverse (Auckland and Queenstown) and the ten least diverse urban areas are identically ranked across the two measures. At intermediate levels of diversity, the rankings differ for some

urban areas. The largest differences in ranking are for Wellington and Kapiti, which $\tilde{F}^D$ implies are relatively less diverse than is implied by simple fractionalisation, and Hawera and Whakatane, which appear relatively more diverse when measured using the social difference measure.

To illustrate the factors behind differences in F and $\tilde{F}^D$, Appendix Table 3 provides a partial summary of ethnic / birthplace composition in 2018 across the main urban areas (i.e., the shares of the six largest groups nationally), with urban areas listed in descending order of $\tilde{F}^D$. Kapiti has a relatively high proportion of English-born residents (at 10.8%, over twice the national average). This mix contributes to diversity as measured by fractionalisation, but contributes less to social difference-based diversity because of the relatively low social difference between English-born residents and members of the dominant NZ-born-European group. For Wellington, the high proportion of 'other' country of birth groups (29.7%) contributes to high (simple) fractionalisation, but the mix of groups contributes relatively less to the average social difference measure.

More generally, diversity is negatively related to the size of the largest (NZ-born European ethnicity) group, which ranges from around 30% in Auckland and in Queenstown to 78 percent in Greymouth, and positively related to the share of the local population from groups other than the six overall largest. The latter ranges from below 10% in Greymouth and Feilding, to over 40% in Queenstown and Auckland. There is, however, also considerable variation in the shares of local populations in each of the 6 overall largest groups. Residents born in China or India together account for less than 2 percent of the population in over half of the urban areas. In contrast, these two groups constitute over 5 percent of residents in 5 urban areas, and over 12 percent in Auckland. The variation in country mixes certainly provides scope for F and $\tilde{F}^D$ to provide contrasting pictures of relative diversity across urban areas. However, as shown in Table 3, and plotted in the top panel of Figure 2, the differences in relative diversity levels and the ranking of urban areas are modest.

5.2   Change in diversity

The numeric change in diversity between 1976 and 2018 is very similar whether measured by fractionalisation or by group-share weighted social difference, increasing in all urban areas by between 0.06 and 0.43 (see Table 2). However, because social difference-based diversity is always smaller than simple fractionalisation, the change in difference-based diversity represents a larger proportional increase in measured diversity. Social difference-based diversity more than doubled in three urban areas (Queenstown, Ashburton, and Rangiora). Queenstown is the urban

area with the greatest increase in diversity between 1976 and 2018 by either measure ($\tilde{F}^D$ change = 0.38; F change=0.43). Among the 31 main and secondary urban areas in 1976, Queenstown was ranked 15th based on F (19th based on $\tilde{F}^D$), and had risen to be the second most diverse urban area in 2018. Queenstown is an extreme case of the overall convergence of diversity levels over time. The spatial convergence in terms of both fractionalisation and group share-weighted social difference is shown in Figure 3. Urban areas that had the lowest diversity measures in 1976 experienced the greatest percentage increase in the two measures over the 1976-2018 period. Interestingly, when drawing regression lines in these scatter plots (which measure the rate of conditional convergence), we see that the line for social difference is more steeply sloping down than the one for fractionalisation. This is very plausible because of two reasons: firstly, the relative growth of the Māori and Pasifika groups among the New Zealand born population and, secondly, the growth in immigration from 'non-traditional source countries' since the late 1980s. At that time the New Zealand immigration policy system changed from one in which preference was given to applications from traditional source countries to one with a preference for skills and other economically-motivated criteria, implemented by means of a points system (see, e.g., NZPC, 2021). Both these changes led to growing population shares of groups that have a greater social distance from the New Zealand-born population of European descent. Table 3 shows this effect in the final column of Table 3, which reports the ratio of the 1976-2018 percentage growth in social difference over the corresponding growth in fractionalisation. This ratio is much greater than one in all but one of the urban areas. The exception is Pukekohe (0.98).[4]

Nonetheless, fractionalisation and social difference generally showed the same trends over time. This can be seen from Figure 4, which shows the time patterns of diversity change in the two largest urban areas, Auckland and Wellington, and in Queenstown, based on both simple fractionalisation and social difference. Apart from the level-difference between the two measures, the patterns are very similar. The only substantive difference is that the social difference measure was flat between 1976 and 1986 in Queenstown, while the fractionalisation measure suggested a decline. Both measures show sustained diversity growth in Queenstown from 1986, overtaking Wellington just prior to 2006, and almost matching Auckland diversity levels by 2018. Both measures also show Auckland's diversity rising faster than Wellington's since 1991.

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[4] It is not clear what caused the relatively low social difference growth in Pukekohe. Appendix Table 3 shows that by 2018 Pukekohe had notably higher than average shares of 'NZ born Europeans' and notably lower 'China PRC' and 'all other groups' shares – which would be consistent with slower growth in social difference – but also a relatively high 'NZ born Maori' share, which would have the opposite effect.

The faster growth in social difference-based diversity has been most pronounced in the second half of the 1976-2018 period, when immigrant growth has been most pronounced. Even while there may have been a diverse mix of countries of birth present prior to 1986, there were relatively low levels of social difference between these countries – at least compared with the degree of social difference evident in later years.

6   Discussion

Conceptually, a social difference-based measure of diversity is more informative than simple fractionalisation because it captures not only the potential for diverse interactions within residential areas, but also the strength of social difference involved in those interactions. Capturing the degree of social difference provides a more appropriate diversity measure for studying the impact of diversity where the impact depends on the quality of interactions. Interactions between people whose views are very similar may do little to generate innovative or productive ideas that are generally associated with diversity (see, e.g., Ozgen, 2021, for a review of the evidence). Conversely, if interactions involve people with vastly different values, attitudes, and identities, it may be difficult to achieve effective communication.

In practice, however, the two measures do not show a markedly different picture of relative diversity and change in diversity across urban areas in New Zealand. Diversity increased in all urban areas, and by a similar amount, whether measured by simple fractionalisation or by difference-based diversity. The higher *proportional* change in diversity when measured by social difference reflects the fact that the increase in the proportion of migrants has also raised the average social difference between residents. Additionally, the share of those of European descent has been declining among the New Zealand born population.

Overall, relying on simple fractionalisation to capture relative diversity differences across urban areas, or patterns of diversity change, provides a reliable picture, despite the conceptual superiority of a social difference-based measure. Simple fractionalisation measures are certainly much easier to calculate, given that they require only population shares for each group. It can be argued, however, that measuring the growth in diversity by fractionalisation underestimates the likely experience of diversity by population groups, given that the group-share weighted average social difference has been growing faster than fractionalisaton.

Our study provides a valuable corroboration of the existing studies of diversity across New Zealand urban areas. Our analysis could, of course, be further extended in various ways. First, social difference-based diversity measures could be calculated to reflect potential interactions at spatial scales other than urban areas, even going down to meshblocks. This could be done to

extend the measurement of segregation at different spatial scales (e.g., Reardon et al., 2008), or to gauge the nature of potential interactions at other locations, such as workplaces, as in Maré and Poot (2019a). Second, although our focus has been on applying difference-based measures to diversity *between* country-of-birth and ethnicity groups, the approach of using survey-based social difference measures could be applied to compare *within*-group diversity with between-group diversity in the same way as, for example, Alimi et al. (2021) compared within-group income inequality with between-group income inequality. There is undoubtedly marked social difference within the groups we have considered. Investigating this should be a priority for future research, to develop a richer picture of urban diversity that focuses not only on inter-group differences. Finally, an obvious additional direction for future research is to estimate how social difference-based diversity in urban areas relates to social, economic, and political outcomes and then compare these relationships with the corresponding ones estimated with simple fractionalisation measures.

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Tables and Figures

Table 1: Fractionalisation in main urban areas across selected domains

Main Urban Area	Ethnicity	Country of birth	Religion	Field of study	Language	GSS-based country/ ethnicity
Auckland	**0.796**	**0.740**	**0.849**	0.813	**0.635**	**0.853**
Rotorua	0.739	0.468	0.834	0.797	0.495	0.782
Gisborne	0.702	0.359	0.834	0.789	0.425	0.739
Wellington	0.662	0.566	0.805	**0.828**	0.496	0.733
Whangarei	0.640	0.438	0.833	0.788	0.391	0.712
Hamilton	0.631	0.492	0.826	0.806	0.425	0.697
Napier-Hastings	0.564	0.406	0.831	0.790	0.355	0.642
Palmerston North	0.576	0.448	0.818	0.799	0.391	0.638
Tauranga	0.508	0.448	0.816	0.788	0.317	0.623
Kapiti	0.437	0.483	0.796	0.796	0.286	0.604
Whanganui	0.531	0.349	0.827	0.782	0.328	0.602
Christchurch	0.495	0.482	0.796	0.802	0.367	0.591
New Plymouth	0.464	0.403	0.812	0.794	0.295	0.558
Dunedin	0.448	0.424	*0.767*	0.801	0.334	0.538
Nelson	*0.393*	0.431	0.770	0.792	0.275	0.533
Blenheim	0.418	0.377	0.812	*0.779*	0.275	0.517
Invercargill	0.412	*0.288*	0.797	0.780	*0.245*	*0.473*

Notes: Fractionalisation has been calculated with 2013 census data. The largest number in each column is in bold type and the smallest number is in italic type. The urban areas are ordered by the final column. The country of birth / ethnicity groups that were used in this final column are based on the 2016 General Social Survey and listed in Table 2.

Table 2: Country of birth / ethnicity groups in the 2016 General Social Survey and their average factor scores

Country of birth / ethnicity	Obs. count	Pop. weight	Pop. share	Factor 1: Diversity	Factor 2: Trust	Factor 3: Language	Factor 4: Politics	Factor 5: Friends	Factor 6. Family	Factor 7: Local	Factor 8: Active
Australia	126	56,000	0.017	0.07	0.14	0.07	-0.28	0.01	0.29	-0.12	-0.15
China, People's Republic of	135	70,000	0.021	-0.47	0.87	-0.13	-0.07	0.33	-0.01	-0.67	-0.60
Cook Islands	36	18,000	0.005	-0.39	0.05	0.67	-0.34	0.43	-0.06	0.16	-0.72
Eastern Europe (nfd)	27	15,000	0.004	-0.33	0.53	-0.11	-0.02	0.31	-0.11	-0.43	-0.31
England	312	136,000	0.040	0.59	0.37	-0.09	-0.12	0.15	-0.07	0.07	-0.35
Fiji	108	57,000	0.017	-0.38	0.65	0.55	-0.38	0.38	0.16	0.19	-0.74
India	165	91,000	0.027	-0.35	1.06	0.34	-0.24	0.46	0.15	-0.37	-0.62
Korea, Republic of	36	20,000	0.006	-0.43	0.66	-0.20	-0.26	0.50	-0.07	-0.60	-0.33
Mainland South-East Asia (nfd)	33	15,000	0.004	-0.41	0.29	-0.04	-0.31	0.02	0.36	-0.53	-0.59
Malaysia	27	15,000	0.004	-0.17	0.63	-0.08	-0.12	0.10	0.36	-0.19	-0.68
NZ born, Asian ethnicity	39	27,000	0.008	0.61	0.25	0.27	-0.34	0.42	0.10	-0.02	-0.26
NZ born, European and Māori ethnicity	393	176,000	0.052	-0.13	-0.20	0.57	-0.25	0.24	0.23	0.10	-0.16
NZ born, European ethnicity	4,341	1,774,000	0.525	-0.08	0.05	-0.14	-0.21	0.12	0.20	0.16	-0.20
NZ born, Māori ethnicity	582	236,000	0.070	-0.27	-0.48	1.05	-0.30	0.13	0.25	0.42	-0.11
NZ born, Other multiple ethnicities	114	58,000	0.017	0.59	-0.02	0.52	-0.32	0.36	0.29	-0.08	0.08
NZ born, Other ethnicity	126	43,000	0.013	-0.11	-0.20	-0.43	-0.12	0.04	-0.01	0.27	-0.26
NZ born, Pasifika ethnicity	138	86,000	0.025	-0.34	-0.12	0.28	-0.04	0.71	0.45	-0.08	0.32
Netherlands	39	14,000	0.004	-0.11	0.22	-0.16	0.05	-0.13	0.29	0.12	-0.55
North Africa & Middle East (nfd)	33	14,000	0.004	0.02	0.90	-0.11	-0.14	0.50	0.20	0.00	-0.77
North-East Asia (nfd)	48	24,000	0.007	-0.49	0.82	-0.03	-0.18	0.40	0.13	-0.87	-0.40
North-West Europe (nfd)	27	15,000	0.004	0.74	0.34	0.45	0.07	0.16	-0.16	-0.39	0.21
Other	66	30,000	0.009	-0.23	0.57	-0.02	-0.16	0.23	0.25	-0.25	-0.46
Philippines	87	56,000	0.017	-0.52	1.31	0.41	-0.15	0.51	-0.13	-0.41	-0.52
Polynesia (excludes Hawaii) (nfd)	21	16,000	0.005	-0.36	0.04	0.24	-0.24	0.30	0.25	-0.24	-0.68
Samoa	99	57,000	0.017	-0.44	0.35	0.27	-0.31	0.49	0.40	-0.02	-0.67
Scotland	69	27,000	0.008	0.18	0.22	-0.11	-0.05	0.11	0.06	-0.01	-0.36

Table 2 (continued)

| Country of birth / ethnicity	Obs. count	Pop. weight	Pop. share	Factor 1: Diversity	Factor 2: Trust	Factor 3: Language	Factor 4: Politics	Factor 5: Friends	Factor 6. Family	Factor 7: Local	Factor 8: Active
South Africa	114	65,000	0.019	0.53	0.56	-0.07	-0.13	0.31	-0.16	-0.13	-0.16
Southern Asia (nfd)	36	20,000	0.006	-0.38	0.77	0.33	-0.25	0.20	-0.14	-0.31	-0.53
Southern and East Africa (nfd)	27	13,000	0.004	0.78	0.51	-0.29	-0.20	0.47	0.03	-0.52	-0.50
The Americas (nfd)	48	24,000	0.007	0.94	0.83	0.26	-0.16	-0.06	0.29	-0.24	-0.24
Tonga	42	24,000	0.007	-0.45	0.29	0.28	-0.25	0.64	0.34	0.13	-0.60
United Kingdom (nfd)	126	57,000	0.017	0.69	0.30	-0.14	0.03	0.22	-0.13	-0.44	-0.26
United States of America	39	17,000	0.005	0.84	0.35	0.33	0.56	0.11	0.28	-0.47	-0.18
Western Europe (nfd)	48	16,000	0.005	-0.02	0.46	0.36	-0.19	0.18	0.00	-0.40	-0.27
Total	7707	3,382,000	1.000								

Notes: nfd='Not further defined'. Observation counts are all randomly rounded to base 3. The surveyed population is the usually resident population aged 15 and over.

Table 3: Diversity of NZ main and secondary urban areas

	Level of diversity (2018)		Change in diversity 1976-2018		
	Fractionalisation (F)	Social difference $(\tilde{F}^D)$	Fractionalisation (ΔF)	Social difference $(\widetilde{\Delta F^D})$	Relative Growth $(g\tilde{F}^D / gF)$
Auckland	0.876	0.683	0.25	0.24	1.36
Queenstown	0.871	0.658	0.43	0.38	1.40
Rotorua	0.781	0.642	0.15	0.17	1.52
Tokoroa	0.786	0.618	0.08	0.09	1.50
Gisborne	0.723	0.597	0.16	0.17	1.40
Hamilton	0.722	0.590	0.23	0.23	1.37
Whakatane	0.715	0.586	0.09	0.11	1.60
Pukekohe	0.728	0.583	0.19	0.15	0.98
Wellington	0.751	0.583	0.16	0.17	1.52
Whangarei	0.719	0.582	0.19	0.19	1.35
Napier/Hastings	0.655	0.528	0.16	0.16	1.35
Palmerston North	0.652	0.525	0.25	0.24	1.35
Taupo	0.659	0.523	0.07	0.09	1.75
Tauranga	0.638	0.507	0.13	0.14	1.49
Christchurch	0.633	0.498	0.23	0.23	1.50
Levin	0.632	0.491	0.14	0.13	1.27
Whanganui	0.598	0.487	0.16	0.17	1.47
Hawera	0.554	0.454	0.17	0.17	1.35
New Plymouth	0.597	0.442	0.06	0.09	2.29
Masterton	0.563	0.442	0.17	0.17	1.44
Kapiti	0.565	0.442	0.16	0.15	1.30
Nelson	0.551	0.425	0.18	0.18	1.51
Dunedin	0.547	0.421	0.19	0.19	1.55
Blenheim	0.536	0.416	0.22	0.20	1.33
Invercargill	0.495	0.389	0.17	0.17	1.48
Feilding	0.494	0.387	0.14	0.13	1.28
Ashburton	0.470	0.367	0.23	0.21	1.40
Rangiora	0.456	0.334	0.21	0.17	1.21
Oamaru	0.439	0.332	0.18	0.16	1.34
Timaru	0.413	0.32	0.16	0.16	1.58
Greymouth	0.385	0.295	0.11	0.11	1.49

Notes: Urban areas are listed in descending order of $\tilde{F}^D$ in 2018.

Figure 1: Social difference map
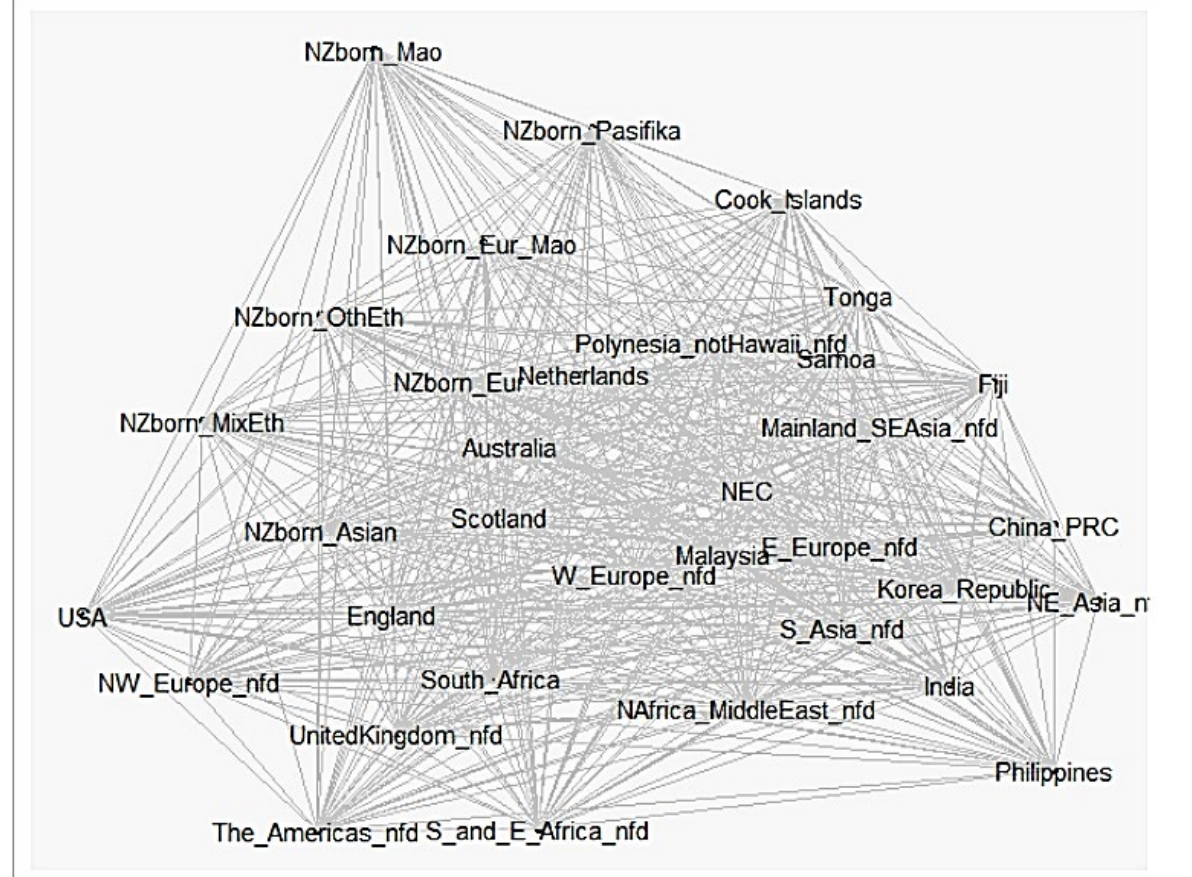
Notes: See Table 2 for the full description of the country of birth / ethnicity groups and the number of observations in the 2016 General Social Survey.

Figure 2: Level and growth of diversity: Comparing two diversity measures

2018 level of diversity

1976 – 2018 growth in diversity
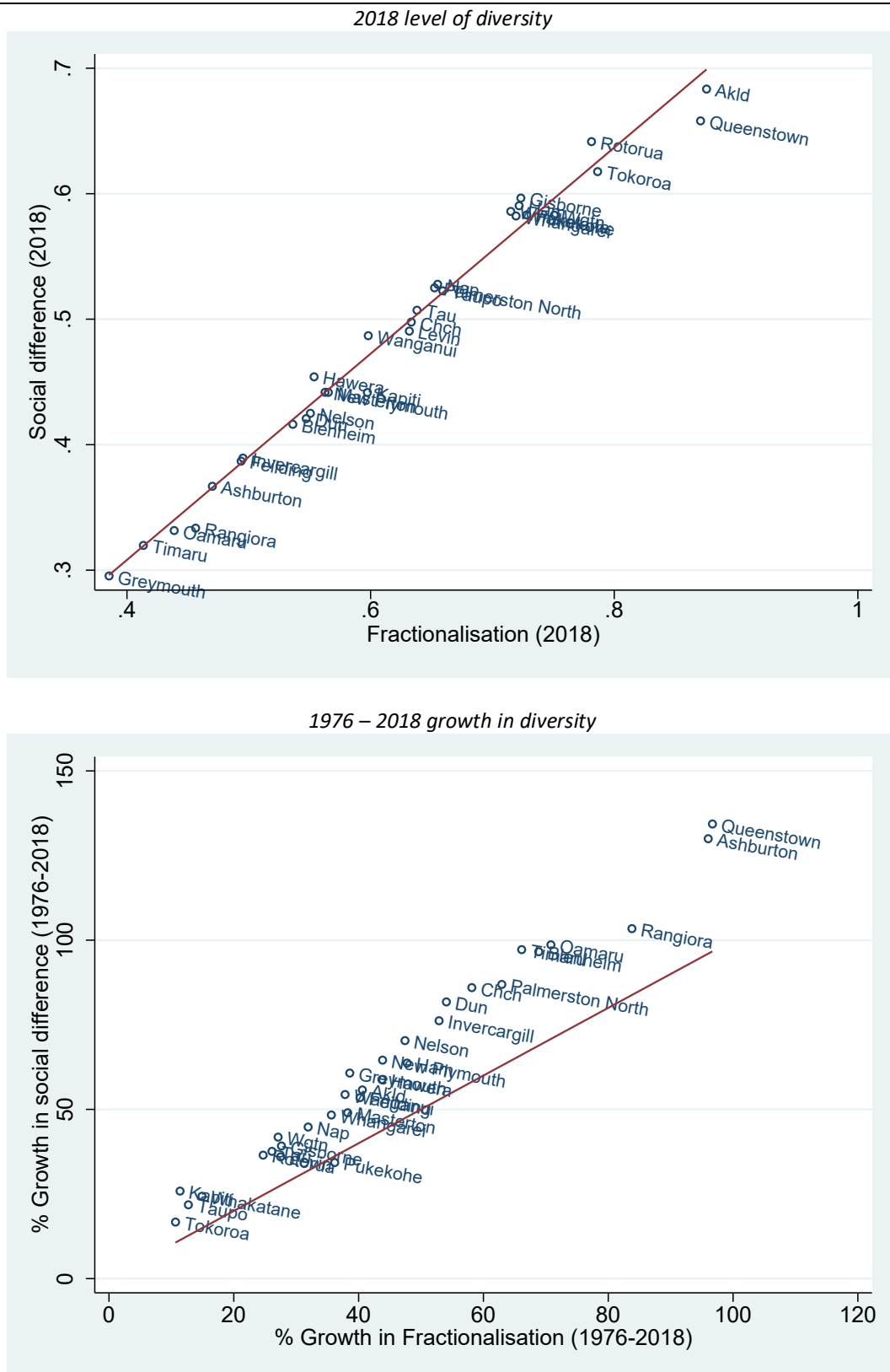
Notes: The line in the upper panel is a line of best fit. In the lower panel, the line indicates equal growth rates.

Figure 3: Convergence of urban area diversity levels over time
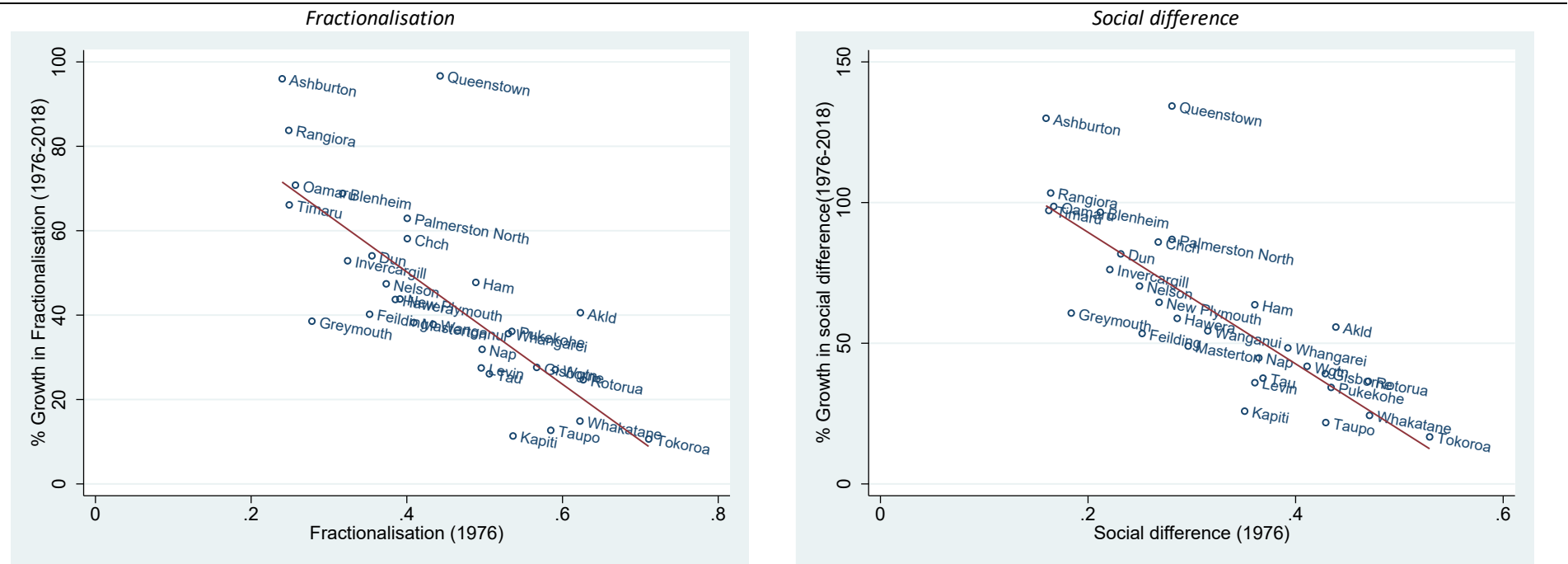
Notes: The added lines are lines of best fit. The slope parameter in the left panel is -132.8 (se=21.4). The slope in the right panel is -234.6 (se=33.1)

Figure 4: Diversity trends: Selected urban areas
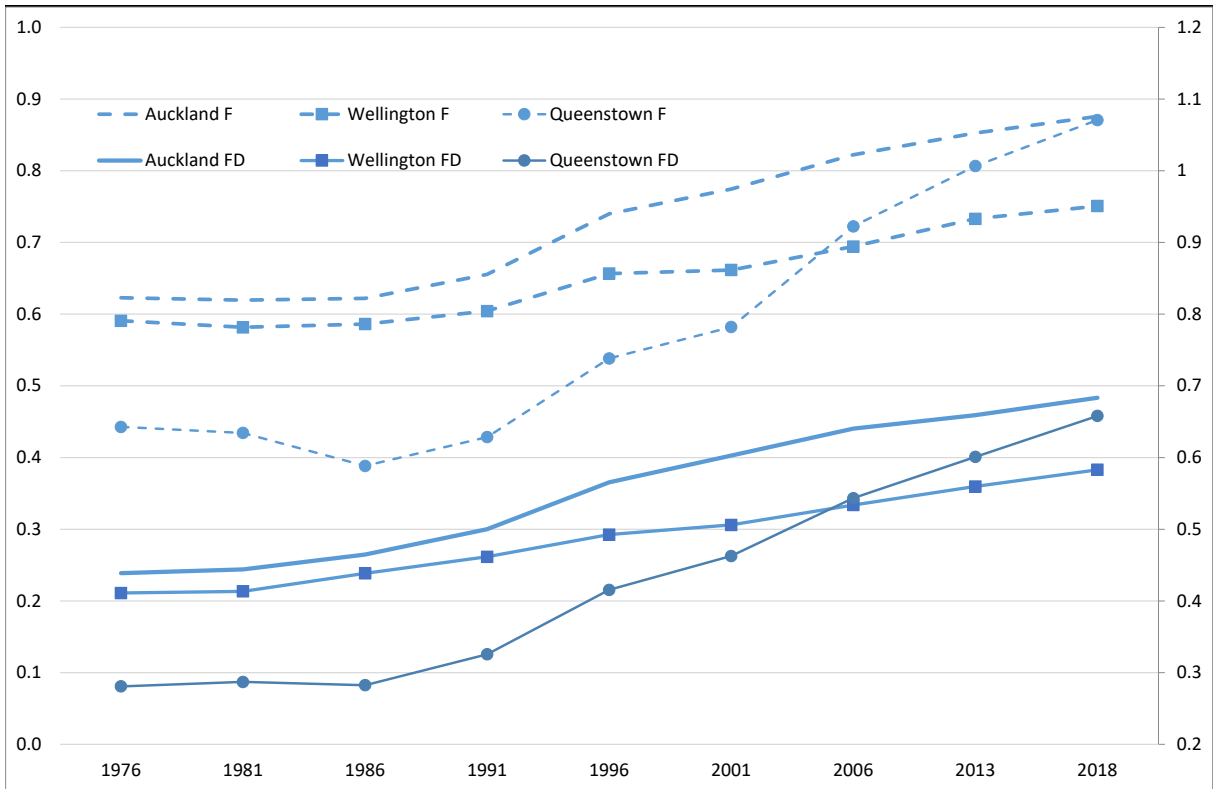
Note: FD refers to social difference. F refers to simple fractionalisation.

Appendix

Appendix Table 1: GSS Questions and coding

Domain (short name)	Question		Coding	Recoding
Associational membership				
• AMS: Belong	Which, if any, of these groups clubs or organisations do you belong?		List of 11	1 if yes to any
Acceptance of diversity				
• AOD:language		used a different language to you?	11(v.comfortable)-15(uncomfortable)	reversed
• AOD:disability		had a disability or long-term health condition	11(v.comfortable)-15(uncomfortable)	reversed
• AOD:ethnic	How would you feel if you had a new neighbour who	was a different ethnicity to you?	11(v.comfortable)-15(uncomfortable)	reversed
• AOD:illness		had a mental illness?	11(v.comfortable)-15(uncomfortable)	reversed
• AOD:gender		was a different sexual orientation to you?	11(v.comfortable)-15(uncomfortable)	reversed
• AOD:religion		was from a religious minority?	11(v.comfortable)-15(uncomfortable)	reversed
Cultural Identity				
• CUL:identity	How easy or hard is it for you to be yourself in New Zealand?		11 (v.easy)-15 (v.hard)	reversed
Cultural participation				
• CUP:crafts		taken part in any arts or crafts, such as weaving, carving or knitting?	11 (daily)-15(not at all)	reversed
• CUP:active		done any active recreation, such as kicking a ball or cycling in the park?	11 (daily)-15(not at all)	reversed
• CUP:performance	In the last four weeks, how often have you	taken part in performing arts, such as dance, music, or theatre?	11 (daily)-15(not at all)	reversed
• CUP: sport		done any of the following: competitions, events, or other organised activities, such as playing bowls, soccer practice or netball games?	11 (daily)-15(not at all)	reversed
• CUP:video		made a film or video or taken photographs for artistic purposes?	11 (daily)-15(not at all)	reversed
• CUP:writing		done any creative writing, such as poetry, short stories, or song-writing?	11 (daily)-15(not at all)	reversed

Appendix Table 1 (continued)

Domain (short name)	Question		Coding	Recoding
Language				
• LAN:Fluent	How well are you able to speak Maori in day-to-day conversation?		11(very well)-15(not at all)	reversed
• LAN:Bilingual		it would be good if all people living in New Zealand spoke Maori and English?	11(agree)-15 (disagree)	reversed
• LAN:Govt	How much do you agree or disagree that	the government should encourage and support the use of Maori in everyday situations?	11(agree)-15 (disagree)	reversed
• LAN:School		Maori should be a core subject in primary schools?	11(agree)-15 (disagree)	reversed
• LAN:signs		Signage should be in both Maori and English?	11(agree)-15 (disagree)	reversed
Political participation				
• POL:Advocacy		taken part in an advocacy, activist, or neighbourhood interest group?	1yes-2no	reversed
• POL:Petition	In the last 12 months, have you	signed a petition, an e-petition, or written a submission?	1yes-2no	reversed
• POL:Protest		taken part in a demonstration, protest, or march?	1yes-2no	reversed
Social Connectedness				
• SOC:FamContact	How would you describe the amount of contact you have with family or relatives who don't live with you		11(too much)-15(not enough)	reversed
• SOC:Famphone	In the last four weeks, how often have you (with any family or relatives who don't live with you)	talked over the telephone or mobile phone	11(daily)-15(not at all)	reversed
• SOC:FamTalk		talked in person	11(daily)-15(not at all)	reversed
• SOC:Famvideo		had video conversations such as skype	11(daily)-15(not at all)	reversed
• SOC:FamWrite		had written conversations such as text messages, email or postal mail	11(daily)-15(not at all)	reversed
• SOC:FriendContact	How would you describe the amount of contact you have with friends who don't live with you		11(too much)-15(not enough)	reversed
• SOC:Friendphone	In the last four weeks, how often have you (with any friends who don't live with you)	talked over the telephone or mobile phone	11(daily)-15(not at all)	reversed
• SOC:FriendTalk		Talked in person	11(daily)-15(not at all)	reversed
• SOC:Friendvideo		had video conversations such as skype	11(daily)-15(not at all)	reversed
• SOC:FriendWrite		had written conversations such as text messages, email or postal mail	11(daily)-15(not at all)	reversed

Appendix Table 1 (continued)

Domain (short name)	Question		Coding	Recoding
Social Identity				
• SOI:Family		your family	0 (none) - 10 (v. strong)	
• SOI:neighbour	How would you	your neighbourhood	0 (none) - 10 (v. strong)	
• SOI:NZ	describe your	New Zealand as a whole	0 (none) - 10 (v. strong)	
• SOI:OtherCountry	sense of	any other countries	0 (none) - 10 (v. strong)	
• SOI:Region	belonging to:	the region you live in	0 (none) - 10 (v. strong)	
• SOI:Religion		your religious or spiritual group	0 (none) - 10 (v. strong)	
Trust				
• Trust:General	In general, how much do you trust most people in New Zealand?		0(not at all) -10 (completely)	
• Trust:Courts		the courts	0(not at all) -10 (completely)	
• Trust:Education		the education system	0(not at all) -10 (completely)	
• Trust:Health	How much do	the health system	0(not at all) -10 (completely)	
• Trust:Media	you trust	the media	0(not at all) -10 (completely)	
• Trust:Parliament		Parliament	0(not at all) -10 (completely)	
• Trust:Police		The police	0(not at all) -10 (completely)	

Appendix Table 2: Factor loadings

	Factor 1: Diversity	Factor 2: Trust	Factor 3: Te reo	Factor 4: Politics	Factor 5: Friends	Factor 6. Family	Factor 7: Local	Factor 8: Active
Eigenvalue	4.45	3.62	3.08	2.34	1.94	1.84	1.82	1.78
% explained variance	21%	17%	15%	11%	9%	9%	9%	9%
Factor loadings								
AOD:ethnic	**0.92**	0.09	0.08	0.10	0.02	0.01	0.01	0.01
AOD:religion	**0.88**	0.08	0.03	0.07	0.01	-0.01	0.03	-0.01
AOD:gender	**0.87**	0.05	0.05	0.10	-0.02	0.02	0.00	0.06
AOD:language	**0.85**	0.11	0.11	0.08	0.03	0.01	0.00	-0.01
AOD:disability	**0.82**	0.01	0.05	0.12	-0.01	0.00	0.10	0.01
AOD:illness	**0.61**	0.01	0.13	0.06	0.03	-0.04	0.03	0.06
Trust:Parliament	0.03	**0.76**	-0.01	-0.04	0.04	-0.01	0.03	0.06
Trust:General	0.08	**0.72**	0.01	-0.03	-0.02	-0.01	0.08	0.06
Trust:Courts	0.02	**0.70**	0.03	-0.04	0.02	0.04	0.14	0.01
Trust:Health	-0.03	**0.65**	0.05	-0.08	0.04	-0.01	0.03	-0.02
Trust:Education	0.03	**0.62**	0.03	-0.04	0.05	-0.01	0.11	0.02
Trust:Police	0.12	**0.61**	-0.10	0.01	-0.07	0.01	0.20	0.06
Trust:Media	0.16	**0.51**	-0.02	0.06	0.00	-0.01	0.21	0.07
LAN:Govt	0.13	0.03	**0.84**	0.16	0.03	0.03	0.03	0.01
LAN:School	0.13	0.04	**0.83**	0.14	0.00	0.03	0.01	0.02
LAN:Bilingual	0.06	0.06	**0.82**	0.08	0.01	-0.01	0.01	-0.01
LAN:signs	0.10	0.05	**0.74**	0.12	0.02	0.01	-0.02	-0.02
LAN:Fluent	-0.01	-0.21	**0.47**	0.17	0.03	0.05	0.14	0.17
POL:Advocacy	0.07	-0.09	0.04	**0.62**	-0.08	0.00	0.19	-0.03
POL:Petition	0.19	-0.13	0.07	**0.58**	-0.05	-0.02	0.07	0.04
CUP:writing	0.03	0.06	0.14	**0.53**	0.17	0.02	-0.20	0.17
POL:Protest	0.11	-0.20	0.22	**0.51**	0.03	0.01	0.10	-0.06
CUP:video	0.09	0.07	0.09	**0.49**	0.10	0.02	-0.16	0.15
CUP:performance	-0.05	0.09	0.15	**0.45**	0.15	0.05	-0.03	0.24
CUP:crafts	0.05	0.00	0.03	**0.40**	0.02	0.04	0.01	0.01
SOC:FriendTalk	0.01	0.00	0.04	0.09	**0.76**	0.02	0.08	0.13
SOC:Friendphone	0.00	-0.03	-0.03	0.11	**0.64**	0.21	0.09	0.03
SOC:FriendContact	-0.03	0.06	-0.02	-0.06	**0.60**	-0.03	0.09	0.01
SOC:FriendWrite	0.16	0.02	0.13	0.19	**0.57**	0.20	-0.16	0.25
SOC:Famphone	-0.01	-0.03	-0.02	0.08	0.06	**0.77**	0.12	-0.04
SOC:FamWrite	0.10	-0.02	0.11	0.15	0.13	**0.70**	-0.07	0.11
SOC:FamTalk	-0.04	-0.12	0.01	0.01	-0.03	**0.56**	0.21	0.02
SOI:Region	-0.02	0.21	0.04	0.02	0.11	0.11	**0.63**	-0.01
SOI:NZ	0.05	0.18	0.06	0.03	0.03	0.11	**0.59**	-0.01
SOI:neighbour	0.03	0.20	0.04	0.05	0.07	0.09	**0.54**	0.00
CUP: sport	0.00	0.08	0.03	0.09	0.13	0.00	0.01	**0.78**
AMS: Belong	0.04	0.04	-0.04	0.03	0.06	-0.04	0.10	**0.77**
CUP:active	0.09	0.05	0.09	0.17	0.10	0.04	-0.03	**0.50**
CUL:identity	0.27	0.11	-0.01	-0.04	0.01	0.05	0.29	0.12
SOI:Family	0.06	0.20	0.03	0.03	0.03	0.24	0.32	0.04
SOI:OtherCountry	-0.03	0.29	0.02	0.15	0.11	0.03	-0.22	-0.15
SOI:Religion	-0.16	0.16	0.07	0.18	0.09	0.07	0.05	-0.15
SOC:Famvideo	0.01	0.24	0.10	0.21	0.07	0.25	-0.26	-0.01
SOC:FamContact	-0.06	0.09	-0.02	-0.07	0.10	0.39	0.09	-0.05
SOC:Friendvideo	-0.02	0.21	0.09	0.29	0.27	0.10	-0.26	0.08

Appendix Table 3: **Birthplace / ethnicity composition of urban areas (2018 Census)**
(proportion of adult population in each of the six nationally largest groups)

	NZborn Europ	NZborn Maori	NZborn Eur & Maori	England	China PRC	India	All other groups
Auckland	31.5%	4.3%	3.7%	4.8%	7.8%	5.8%	42.1%
Queenstown	30.0%	1.3%	2.3%	10.9%	2.3%	3.1%	50.2%
Rotorua	38.4%	23.2%	10.9%	4.0%	1.5%	3.5%	18.6%
Tokoroa	38.3%	20.9%	11.2%	3.0%	0.5%	0.6%	25.5%
Gisborne	41.1%	30.3%	11.8%	3.0%	0.4%	0.9%	12.5%
Hamilton	50.6%	10.4%	7.0%	4.3%	3.1%	3.4%	21.2%
Whakatane	47.5%	21.4%	9.8%	5.2%	0.5%	1.1%	14.5%
Pukekohe	50.0%	9.8%	6.0%	5.5%	0.9%	3.7%	24.0%
Wellington	48.4%	5.1%	5.4%	6.0%	2.4%	3.0%	29.7%
Whangarei	48.5%	17.2%	10.3%	5.1%	0.7%	1.6%	16.5%
Napier/Hastings	56.5%	12.6%	7.3%	5.0%	0.6%	1.8%	16.2%
Palmerston North	57.7%	7.0%	7.4%	3.8%	2.1%	2.1%	20.1%
Taupo	56.2%	10.9%	8.6%	6.3%	0.6%	1.6%	15.9%
Tauranga	58.7%	7.4%	6.5%	6.9%	0.7%	2.4%	17.4%
Christchurch	59.7%	3.2%	4.4%	5.2%	3.1%	2.2%	22.2%
Levin	58.8%	9.7%	8.7%	5.5%	1.1%	0.7%	15.5%
Whanganui	61.3%	12.7%	8.2%	3.9%	0.7%	0.9%	12.4%
Hawera	64.9%	12.8%	8.2%	2.7%	0.2%	0.8%	10.4%
New Plymouth	65.2%	5.7%	6.5%	5.3%	0.8%	1.6%	14.8%
Masterton	64.5%	8.6%	8.8%	4.2%	0.3%	0.9%	12.7%
Kapiti	62.0%	3.4%	5.3%	10.8%	0.5%	0.7%	17.2%
Nelson	66.3%	3.2%	4.3%	7.5%	0.5%	0.8%	17.5%
Dunedin	66.7%	2.2%	4.8%	4.8%	1.6%	1.1%	18.7%
Blenheim	67.4%	4.3%	6.1%	5.1%	0.5%	1.0%	15.7%
Invercargill	70.3%	5.4%	7.5%	2.2%	1.1%	1.1%	12.4%
Feilding	70.2%	7.2%	7.2%	4.7%	0.2%	0.5%	9.8%
Ashburton	72.4%	3.2%	3.3%	3.1%	0.3%	0.9%	16.8%
Rangiora	73.0%	2.1%	3.8%	8.8%	0.2%	0.6%	11.4%
Oamaru	74.6%	2.3%	3.9%	4.0%	0.8%	0.6%	13.8%
Timaru	76.3%	2.7%	4.2%	3.5%	0.5%	1.2%	11.6%
Greymouth	78.1%	3.1%	5.4%	2.5%	0.3%	0.7%	9.8%
Pooled 31 UAs	46.7%	6.2%	5.2%	5.1%	4.2%	3.6%	29.1%

Note: Urban areas are listed in descending order of scaled average social difference $\widetilde{F}^D$ in 2018. See Table 3. The shares reported in the bottom line are not identical to those reported for these groups in Table 2, because the latter table was derived from the 2016 General Social Survey.