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Intergenerational earnings persistence in Aotearoa New Zealand

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Disclaimer

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI, please visit https://www.stats.govt.nz/integrated-data/. The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements

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Abstract

We present estimates of intergenerational earnings persistence (IEP) in New Zealand using linked administrative data. We assemble a dataset of around 288,000 individuals born between 1986 and 1992 and link them to their parents using data from various administrative datasets, 2013 and 2018 Censuses, and household surveys. We examine inter-generational persistence in outcomes including income source and access to employment. For around 198,000 cases where both parents and children are actively participating in the labour market (defined as earning wages and salaries for more than 6 months a year), we estimate IEP, including by ethnic groups. Our preferred (IV) overall rank-rank slope of parent-child earning is 0.27. This implies that children experience about one quarter of the earnings advantage or disadvantage of their parents, and that within-family persistence of inequality can explain only a small proportion of sustained inter-family or ethnic disparities. We examine both relative and absolute intergenerational earnings persistence and explore whether persistence depends linearly on parental earnings, varies by ethnicity and gender, or is accounted for by persistence in observed characteristics of children and parents. We discuss the possible causes and consequences of earnings persistence, and the influence of discrimination and racism in the labour market and elsewhere.

JEL codes

J62 - Occupational and Intergenerational Mobility

J70 – Discrimination – General

J15 - Economics of Minorities and Races

Keywords

Intergenerational earnings persistence; ethnicity; Aotearoa New Zealand

Summary haiku

Adult earnings rates

Reflect parental earnings

and ethnicity

Table of Contents

Tables and Figures

1 Introduction

There is persistent variation in earnings between and within ethnic groups. In this study, we examine the contribution of intergenerational, intra-family earnings persistence to earnings rate inequality for six ethnic groups in Aotearoa New Zealand. Our focus is on ethnic variation in intergenerational earnings persistence, with the aims of understanding the factors that perpetuate sustained ethnic pay differences, and helping to identify actions that are most likely to reduce those differences.

We investigate the relationship between parent earnings and child earnings, to see whether durable inequalities within and between ethnic groups are perpetuated within families or reflect broader group-level patterns that may reflect discrimination or systemic racism. We examine the contributions of transmitted advantage (children of high-earning parents have relatively high earnings) and transmitted disadvantage (children of low-earning parents have relatively low earnings) to earnings-rate persistence within-family persistence. We also examine whether the strength of within-family persistence in earnings can be accounted for by persistence in earnings-related characteristics such as qualifications, location, and access to high-paying employers.

Our analysis extends a relatively small literature on intergenerational persistence in New Zealand (Brown, 2022; Gibbons, 2010; Iusitini, 2022; Maré & Stillman, 2010). First, it provides estimates of intergenerational earnings persistence for six ethnic groups in New Zealand, using a novel (instrumental variables) estimation approach, and a novel dataset that identifies parent-child relationship from a wider range of data sources than have been used in existing New Zealand studies. It focuses on persistence of earnings rates, in contrast to previous studies that have focused on income, education, or social class. Our study presents estimates of absolute as well as relative earnings persistence, and provides covariate-adjusted estimates of persistence, controlling for persistence in observed characteristics of parents and children. Although our main analysis relates to earnings rates, we also report on ethnic variation in intergenerational persistence of sources of income, and of employment intensity.

The analysis of intergenerational earnings persistence requires longitudinal data on parents and children, which until recently have been unavailable at a comprehensive scale in New Zealand. The ability to link data on parents and children's earnings has, in the past, been available for only a subset of the population (such as in the Christchurch Health and Development Study or

the Dunedin study) with limited coverage over the entire population or income distribution. Iusitini (2022) using broad-coverage longitudinal Census data for New Zealand but even that has restricted coverage of some ethnic and migrant groups. We use linked administrative data – an approach that is increasingly common in international studies of intergenerational persistence. There is a growing literature from the US, Europe and Australia as access to linked administrative and census data has enabled the estimation of persistence including at a detailed geographical level (Abramitzky et al., 2025; Acciari et al., 2022; Andrews et al., 2019; Bratberg et al., 2005; Chetty et al., 2014, 2017; Corak et al., 2014; Deutscher & Mazumder, 2020; Jäntti & Jenkins, 2015).

Although it is well established that non-Europeans earn less than New Zealand-Europeans with similar skills (Cochrane & Pacheco, 2022), the mechanisms that perpetuate inequality are less well understood. Racism and other forms of discrimination in the labour market certainly play a part but differences in labour market outcomes will also reflect inequality in other contexts, such as housing, education, and healthcare. Within the labour market, not all groups have the same access to job networks, access to high-paying firms, valued work experience or bargaining strength. Some migrant groups also face the additional challenges of skill recognition, labour market restrictions associated with their visa, or English language proficiency (Cochrane & Pacheco, 2022; Collins, 2020; Daldy et al., 2013; North, 2007; Phillips et al., 2011; Stillman & Maré, 2009).

Examining ethnic variation in intergenerational earnings persistence provides insights into the mechanisms that reproduce persistent inequality, into the extent of discrimination, and into progress in reducing inequality. More broadly, intergenerational earnings mobility is an important socioeconomic indicator - a high rate of mobility reflects a fair and fluid society where one's outcomes are not pre-determined by those of their parents or circumstances in their early life. The title of a recent NZ Productivity Commission Inquiry – "A fair chance for all: Breaking the cycle of persistent disadvantage" (New Zealand Productivity Commission, 2023) – reflects this view, and the focus of social policy on preventing poor outcomes, especially for children.

We analyse ethnic variation in both relative persistence (whether the relative earnings of parents are reflected in the relative earnings of their children) and absolute persistence (whether the level of children's earnings is high or low, conditional on what their parents earn). Our primary measures are derived from rank-rank regressions of children's rank in their income distribution (when they are around 30 years old) on the rank of their parents in their income distribution around when the child was 15 years old. We compare across different ethnic groups using ranks

established from the same national distribution, which provides insights into both relative and absolute persistence.

We present evidence from New Zealand on earnings persistence for 7 birth cohorts born in 1986-1992. We identify over 387,000 children born in 1986-1992, earning income when aged around 30-35 and link them to their parents using information from various administrative datasets in the Integrated Data Infrastructure. For 288,000 of those children, we have sufficient usable information on parental income to examine the persistence of income sources and employment intensity. Our analysis of earnings rate persistence is based on 198,000 children and their parents for whom the necessary data are available..

Across all ethnicities, our preferred (IV) estimate of relative persistence (rank-rank coefficient of parent-child earnings) is 0.27. This implies that if there is a 10-percentile difference in earnings between two groups of parents, the earnings difference between their respective children is expected to be only a 2.7 percentile difference. The implied difference for their grandchildren is even smaller. Intergenerational earnings persistence within families can thus account for only a small proportion of sustained earnings differences between ethnic groups. We find that persistence is stronger for children of higher-earning parents compared with low-earning parents, suggesting that advantage is more persistent across generations than disadvantage. Across ethnic groups, relative earnings persistence is relatively low for Asian children, whose earnings ranks are, on average, considerably higher than those of their parents. Their persistence is relatively low even taking into account substantial intergenerational increases in qualifications for Asian children.

The rest of this paper proceeds as follows. Section 2 reviews the evidence on intergenerational income mobility in New Zealand. Section 3 discusses our approach to assembling the dataset on children and parents using various administrative data sources from the Integrated Data Infrastructure. Section 4 presents our findings, and we conclude by discussing future directions for our research.

2 What we know about intergenerational mobility in New Zealand

There is limited evidence on intergenerational income or earnings mobility in Aotearoa New Zealand. This contrasts with the recent US and Europe literature, in which there has been an

explosion of evidence including among different sub-groups and at detailed geographical levels (see Chetty et al. (2014); Abramitzky et al. (2021); Acciari et al. (2022), and earlier reviews of the literature by Black and Devereux, (2011) and Jäntti and Jenkins, (2015)). The lack of a nationally representative longitudinal dataset that allows identification of long-term family history and includes measures of income has long constrained research on income and earnings mobility in New Zealand. While there is evidence on intergenerational persistence in other socio-economic characteristics such as education (Maré & Stillman, 2010; van der Weide et al., 2024), welfare receipt (Maloney et al., 2003; Pacheco & Maloney, 2003), and social class (Olssen et al., 2011), few studies have examined intergenerational mobility in income or earnings. The earliest estimates of intergenerational mobility in earnings for New Zealand come from Andrews and Leigh (2009) who included New Zealand in their cross-country study of links between intergenerational earnings mobility and economic inequality. Their estimates for intergenerational mobility for New Zealand rely on data on men aged 25- 54 from the 1999 Social Inequality III module from the International Social Survey Programme (ISSP). Although the survey asked questions about the respondent parents, it does not include parental earnings. Instead, Andrews and Leigh proxy for these missing earnings by predicting them using parental occupation which is available in the survey. They find an intergenerational elasticity (IGE) of 0.245 and an intergenerational correlation coefficient of 0.191. The IGE estimates rank New Zealand as only the tenth (IGE) most mobile country in their sample of sixteen countries[1].

Table 1 summarises existing New Zealand studies. The sparseness of the literature is evident in the small number of studies. In addition, these earlier studies are generally limited in terms of what they measure or in coverage of subgroups. Andrews and Leigh lack earnings data and proxy for it using occupational data and are constrained by coverage and sample size. Gibbons relied on evidence from Dunedin and part of Iusitini's evidence is based on data from Christchurch only. Studies using administrative data such as Brown (2022) or Jenkins and Crichton (2024) rely on birth records, which restricts sub-group analysis - especially for the population not born in New Zealand.

Following Andrews and Leigh (2009), Gibbons (2010) provides estimates of the inter-generational elasticity (IGE) of incomes and occupations using two longitudinal surveys: the Dunedin Study of the population of people born in Dunedin in 1972-73; and the 1996 Election

1. These estimates are available in a table in an earlier version of their work – Andrews and Leigh (2008) available as a Centre for Economic Policy Research discussion paper.

Study's post-election nationwide survey.[2] This study estimates an offspring-parents IGE of 0.272, a son-father IGE of 0.290, and a daughter-father IGE of 0.215. The study concludes that rates of intergenerational income mobility for men and women from Dunedin are probably within a similar range to rates of intergenerational income mobility in most other developed countries. However, given that the sample is limited to people in a particular city (Dunedin), Gibbons notes reservations about the representativeness of these results for all of New Zealand, and notes the lack of appropriate representative longitudinal data. He points to the possibility that future large national datasets may contain incomes and allow the matching of individual level data on parents with subsequent data on their grown-up children.

The recent linking of New Zealand censuses from 1981 to 2013 to form a longitudinal data source provided an opportunity to match individuals and parents with both historical and current data on incomes as well as other socio-economic characteristics.[3] Iusitini (2022) and So (2023) have explored this data source to provide evidence of intergenerational mobility in income in New Zealand. Iusitini (2022) takes two approaches to measuring intergenerational income mobility – a permanent income approach and a childhood resources approach. The first approach estimates mobility for a cohort of New Zealand-born children who were under 15 years old at the time of the 1981 Census. Intergenerational mobility estimates from these approaches range from 0.05 for Son-Mother pairs to 0.24 for Son-Father pairs. The childhood resources approach estimates mobility of individuals with respect to their parents' family income over the individual's childhood. Using data from the Christchurch Health and Development Study (CHDS), a longitudinal study tracking a birth cohort of children born in Christchurch in 1977 and followed for 40 years, this approach finds a much higher level of persistence with rates of 0.479 (0.533 for sons, 0.412 for daughters) with respect to their parents' family income over their childhood. However, like Gibbons' study that uses Dunedin data, the design of the CHDS means the results from the Christchurch study are unlikely to be representative for the whole country.

To date, the only two studies on intergenerational income mobility using administrative data in New Zealand are Brown (2022) and Jenkins and Crichton (2024). Both studies use linked administrative data in the Integrated Data Infrastructure to link parents to birth cohorts.[4] Brown

2. OECD (2018) includes New Zealand in some of their cross-country analyses, drawing on Gibbons' (2010) estimates.

3 The low linkage rates over time in the longitudinal Census limits the available sample size. Iusitini's final analytical sample includes only 4,617 son-father pairs and 14,526 son-mother pairs from a possible population of 57,288 son-father pairs and 160,065 son-mother pairs in the longitudinal census.

4. Brown (2022) uses 1985/86 to 1987/88 birth cohorts for income analysis and 1985/86 to 1991/92 cohorts for qualifications analysis. Jenkins and Crichton (2024) use 1986-94 cohorts.

reports a rank-rank coefficient of 0.23 for income (i.e. a 10 percentile increase in parent income rank is associated with a 2.3 percentile increase in the child's expected income rank), with similar patterns of mobility for males and females. Jenkins and Crichton (2024) document considerable subnational variation in intergenerational persistence across neighbourhoods (SA3) and Territorial Authorities/ Local Boards.

3 Creating an intergenerational dataset from administrative data

Our study of intergenerational earnings persistence draws on a range of administrative and survey data available in Statistics New Zealand's Integrated Data Infrastructure (IDI).[5] The data are held in a form that allows linking of de-identified individual-level data from different sources. In this section, we summarise the data that we use to (a) identify birth cohorts of children, (b) identify their parents, (c) capture their earnings and employment, and (d) identify personal characteristics of both children and parents, including ethnicity.

The IDI 'spine' is a list of identifiers for distinct individuals, constructed from tax data, birth records, and immigration visa records (A. Black, 2016). We identify birth cohorts based on individuals on the IDI spine with birthdates between the beginning of 1986 and the end of 1992. We restrict attention initially to children for whom we have some income information[6] in a 3-year period around the year in which they turn 30.[7]

To identify the parents of these children, we collate all parent-child links using information from Department of Internal Affairs Birth records, 2013 Census Records, Ministry of Social Development (MSD) records, Immigration Decision records, DIA Marriage and Civil Union records, DIA Death records, Household Economic Survey (HES), and Household Labour Force Survey

[5] See https://www.stats.govt.nz/integrated-data/integrated-data-infrastructure/#about

[6] Income data are taken from the 'income_cal_yr_summary' table in the IDI, which summarises annual income for which tax is deducted at source (from the Employer Monthly Schedule). The table distinguishes income from wages and salaries, benefits, ACC, Pension, paid parental leave, and student allowances. It also identifies company, partnership, and sole trader income with PAYE or withholding tax payments deducted at source. The income data do not include income for which tax is not deducted at source (sole-trader or rental income reported only in IR3 personal tax returns IR3, director or shareholder income reported in IR4s tax returns, or partnership income reported in IR20 tax forms). The data thus have incomplete coverage of business income, and exclude investment income and overseas income.

[7] Income data are available up to 2023, so age-30 income is potentially observable for all birth cohorts. We report findings centred on ages higher than 30 but these unavoidably exclude some later birth cohorts.

(HLFS).[8] This broad search for parent-child links is preferable to relying on birth records alone, as it is more likely to identify the parents who cared for the child while they were growing up. Furthermore, relying on birth records alone fails to identify non-New Zealand-born children and has limited coverage for particular ethnic or migrant groups (Brown, 2022; Milne et al., 2020). It is also less restrictive than relying on longitudinal census data alone (Iusitini, 2022).

As shown in Table 2, we identify 387,351 children with non-missing income data at some point in the years when they turned 29, 30, or 31, and 688,059 distinct parents linked to those children. From the universe of all possible child-parent links identified from these various administrative datasets, we restrict attention to cases with non-missing parental incomes for the years when the child is between 14 and 16 years old. We prioritise relationships that are corroborated in the data around the time of the child's 15th birthday (in 2001 to 2007 for the cohorts of interest), and relationships where the link is observed multiple times over a longer period. Where multiple parents have the same highest priority, we choose the parent with the highest average wage and salary earnings. Where there are multiple highest-earning parents, we randomly selected one. By linking to the highest earning parents, our analysis is likely to represent the lower bound of persistence especially at the top of the distribution.

The second row of Table 2 reports that we identify 288,048 children linked to one of their parents, and that there are 217,368 distinct parents identified. The number of distinct parents is smaller than the number of distinct children because some parents have more than one child in the 1986-92 birth cohorts. This sample is used to investigate the persistence of having wage and salary earnings, and the intensity of employment between parents and children. We refer to this sample as the 'Employment sample'.

For the analysis of intergenerational earnings, we narrow our focus to cases where both children and parents earn positive wage and salaries for at least 6 months in at least one of the three-year periods around the reference year (at age 30 for children; for parents, when the child was 15). We exclude parents and children whose average earnings over the three-year period is in the top and bottom 1% of their respective distributions to remove outliers. The resulting sample, which we refer to as the 'Earnings Rate sample', contains 198,102 children linked to their parents, as shown in the third row of Table 2.

[8] For the Earnings Rate sample (defined below), Table A1 provides a breakdown of the number of sources in which the parent-child relationship was confirmed. Around 13 percent of the sample was identified from sources other than birth records and only 36% of links were from birth records alone.

In the absence of an hourly wage measure, earnings is measured as real (CPI-adjusted, in $2022) monthly wage and salary earnings as employees, as described in Fabling & Maré (2015). The average is calculated within each calendar year, excluding months in which employees started or ended a job – to reduce the influence of part-months and final payments. Annual averages are combined over the three-year windows around the reference year by simple averaging. Almost half of child and parent averages are based on three years of data. Much of our analysis is based on earnings ranks. We rank earnings into 100 percentile bins, separately for parents and children, and separately by birth cohort.

Our analysis is stratified by the ethnicity of the children, classified based on level 1 ethnicity, as recorded in the IDI personal details table. Level 1 ethnicity identifies 6 distinct ethnicities – European; Māori; Pacific Peoples; Asian; Middle Eastern Latin-American and African (MELAA); and 'Other'[9]. Each child could identify with more than one ethnicity. Our analysis is based on total responses, meaning that each child can be included in more than one subgroup.

4 Persistence of income sources and employment intensity

Although our main focus is on the intergenerational persistence of earnings (see section 5), in this section, we examine whether the likelihood of having wage and salary earnings, or the number of months employed in a year are correlated between parents and children. For each of these outcomes, we use the Employment sample described in the previous section, and a single year of data for children (at age 30) and for parents (when the child was 15).

4.1 Intergenerational persistence in income source

We classify components of each parent's or child's income according to whether it is from wage and salaries earnings (WAS), various types of social assistance (such as welfare receipts, ACC payments etc.), or from other sources captured in the data, including limited types of self-employment and business income. For each child and each parent, we summarise patterns of income sources into one of four categories: i) earning wages and salaries only; ii) earning wages and salaries and any form of social assistance; iii) earning wages and salaries and other forms of

[9] The 'Other' ethnic group is a residual category that includes responses that cannot be allocated to any of the five main ethnicity groups: (Not stated/ don't know/ refused to answer/ unidentifiable)

income for which tax is deducted at source (PAYE or withholding payments); iv) earning income from all other sources apart from wages and salaries.

Table 3 shows the distribution of parent-child pairs across the four patterns of income sources. Fifty-nine percent of children and 69% of parents have wage and salary income as their only recorded source of income. If parent and child income sources were uncorrelated, we would expect 41% (59% * 69%) of pairs (118,400 pairs) to appear in the top-left cell of the table. The number of pairs in that cell is 127,206, or 7% higher than expected ('relative risk' of 1.07). A relative risk greater than one implies that there is a positive relationship between parents having only WAS income and children having only WAS income. The relative risks for each cell are shown in the lower panel of Table 3. The next largest category of income source patterns is a combination of WAS and social assistance. This accounts for 14% of children and 18% of parents, and is persistent between parents and children, with a relative risk of 1.52 (10,800 pairs rather than the expected number of 7,100). An overall measure of persistence is the proportion of child-parent pairs that are in cells where the parent and child categories are the same (cells in bold in Table 3). For income source patterns, this proportion is 50%, which is higher than it would be if parent and child income source patterns were unrelated (relative risk of 1.11).

The first column of Table 4 includes the bolded relative risk measures from the bottom panel of Table 3, together with these overall summary measures. Table 4 also includes, for each ethnic group separately, relative risk measures of persistence for each income source pattern and overall, and the proportion of parent-child pairs where the income source pattern is the same.[10] The highest persistence (relative risk of 1.71) occurs for non-WAS income and for the combination of WAS and Social assistance (1.52). Across ethnic groups, the persistence in these patterns is strongest between European children and their parents, and within the small 'Other' group. For Māori and Pacific pairs, persistence is particularly low for non-wage and salary income and for wage and salary combined with social assistance. This pattern contrasts with the findings reported by Maloney et al (2003), who report a (statistically insignificant) stronger persistence of benefit receipt for Māori children than for non-Māori.[11]

[10]. Proportions of parents and children reporting each category are documented in Table A5.

[11]. Maloney et al (2003) estimate the relationship between welfare receipt (which they refer to as 'dependency') of children at age 16-20 and of parents when the child was 14. They show that using a single year of parent receipt (as we do in Table 3) understates persistence. Their overall single-year estimate is 0.26. The data in Table 3 implies a coefficient on 0.09. Their preferred estimate is in the range 0.33 to 0.64.

4.2 Intergenerational persistence in employment intensity (months per year)

This section examines intergenerational persistence in the intensity of employment over a year, as captured by the number of months with non-zero wage and salary earnings. Table 5 and Table 6 show the relationship between parent's and child's employment intensity. The layout of tables is analogous to those in Table 3 and Table 4. Sixty-seven percent of children and 83% of parents are employed for 6-12 months of the year. Children of parents with 6-12 months of employment are only slightly more likely to themselves be employed for 6-12 months (relative risk of 1.02). However, the children of parents with no months of employment have a raised likelihood of also having no employment (relative risk of 1.70).

Table 6 reports the persistence of the various levels of employment intensity by ethnicity, using relative risk measures (analogous to the diagonal entries in the lower panel of Table 5).[12] The persistence of non-employment is strongest for European children (relative risk of 1.75) and for the small 'Other ethnicity' group (1.86). High employment intensity (6-12 months) is most persistent for Māori (1.04), Pacific (1.03) and MELAA (1.03) children, although the persistence of having missing data is also relatively high for these groups.[13]

5 Persistence in the monthly earnings rate

This section presents findings for our focal research question – the intergenerational persistence of earnings rates – whether the monthly earnings rate received by children is related to the rate received by their parents. Our main specification compares the earnings rank of children with the earnings rank of their parents. Child earnings are measured when the child is around age 30. Parental earnings are measured when the child is around 15 years of age. Children and parents are ranked separately, within the distribution of child earnings or parental earnings respectively. We estimate earnings persistence by child ethnicity, by child and parent gender, and report estimates that control for persistence in different sets of child and parent characteristics.

12. Proportions of parents and children reporting each category are documented in Table A6.
13. The Employment sample is selected as having some income data in a 3-year period. 'Other combinations' includes missing data resulting from using a single year of child data or a single year of parent data.

5.1 Measuring group differences in intergenerational persistence

We identify the effect of differences in intergenerational persistence on sustained earnings rate differences between ethnic groups. We distinguish the effects of relative persistence differences from those of absolute persistence differences. Following Chetty et al (2020), Figure 1 summarises the intergenerational dynamics of ethnic earnings differences. The two solid lines capture the relationship between parent and child earnings ranks for each of two groups, labelled A and B. The group B line is steeper than that of group A, implying greater (relative) persistence of parental rank - parental relative advantage or disadvantage is more strongly related to their children's relative advantage or disadvantage. The group A line is higher than that of group B, implying that, conditional on parental earnings, group A children can expect to have higher earnings than group B children with similarly ranked parents, resulting in absolute persistence of group differences across generations.

Differences in relative persistence and in absolute persistence both have implications for the size and dynamics of group differences. Let R_g^G denote the earnings rank for group *G* (A or B) and generation *g* (P=parent; C=child; SS=steady-state). Figure 1 shows an initial rank difference in earnings between group A and group B parents of 70 (R_P^B=15; R_P^A=85). The group-specific rank-rank relationships shown as the solid lines have a slope of less than one, implying a smaller expected difference of 45 in the next generation (R_C^B=27.5; R_C^A=72.5). Intergenerational dynamics occur as the child generation becomes the next parent generation, and the smaller child gap is further compressed. The change between parent and child ranks is smaller for group B due to the higher relative persistence (steeper curve). Another implication of the higher relative persistence is that earnings inequality within group B declines more slowly than within group A. The process of intergenerational dynamics is captured by the stepped lines that alternate between the rank-rank lines and points where child rank and parent rank are equal (the dashed diagonal line). The process stops when parent and child rates are equal for each group. These *steady state* points are shown as stars, with the steady-state difference between groups of 28 (R_{SS}^B=40; R_{SS}^A=68).

It is important to note that the steady state difference is a useful summary measure of the combined effects of differences in absolute and relative intergenerational persistence. It is *not* a projection of the future prospects facing a group, since it is very likely that both relative earnings and patterns of relative intergenerational persistence will change over time.

There are many possible measures that summarise the extent of intergenerational persistence. Deutscher and Mazumder (2023) review commonly used measures for examining

intergenerational income persistence and identify 16 distinct broad approaches (Table 1), with a generally high degree of correlation between them. Our analysis relies primarily on a global measure of persistence, based on the relationship between the rank of parental earnings among parents, and the rank of children's earnings among children ('rank-rank slope'). The measure is classified as 'global' because it summarises the degree of persistence across the entire distribution.[14] When looking at the overall distribution (pooled across ethnic groups), the measure is purely a relative measure, with a mean rank of 50 for both parents and children. When looking at persistence for specific ethnic groups, we rank parents and children using their respective national rather than ethnicity-specific ranks, which provides a "weakly absolute" measure that captures whether, conditional on parent rank in the national distribution, there is variation across ethnic groups in the expected child rank.[15].

The basic specification for estimating the rank-rank slope is a linear regression of a child's earning rank at around age 30 (R_C) on their parent's earnings rank when the child was around 15 (R_P). Observations from multiple birth cohorts are pooled, with separate cohort-specific intercepts (α_j). As noted in section 3, the underlying earnings measures are average monthly earnings within a 3-calendar-year period, which are ranked separately by birth cohort, and separately for children and parents within each child birth cohort. The main coefficient of interest is the coefficient β in the following regression:[16]

$$R_C = \alpha_j + \beta * R_P + e_R \quad (1)$$

Black and Devereux (2011) summarise the econometric issues that arise when estimating an equation such as equation (1) using either earnings or earning ranks. The primary challenge is the treatment of measurement error in parental earnings. As demonstrated by Solon (1992) and Zimmerman (1992), this measurement error can lead to substantial attenuation (downward) bias in estimates of β. Ideally, the parental earnings measure should capture the underlying lifetime earning capacity of parents. Any single year of parental earnings will also capture transitory fluctuations in earnings. Furthermore, lifecycle variation in earnings means that the age at which parents' earnings are observed affects the reliability of single-year earnings as a proxy for lifetime earnings capacity, and the most relevant age at which to measure earnings can vary across individuals due to factors such as education (S. Jenkins, 1987; Nybom & Stuhler, 2013, 2016).

14. 'Local' measures capture persistence or mobility at specific points of the earnings distribution.
15. Black and Devereux (2011) refer to this measure as URM/ DRM (upward rank mobility/ downward rank mobility). Figure 3 provides an absolute measure based on persistence in the (log) level of earnings.
16. In section 5.3.3, we also report estimates of regressions that include additional parent and child characteristics.

Previous studies have found that these biases are reduced if parental earnings are measured over multiple years, if earnings are measured at ages of around 30-45 years, or if earnings measured in terms of ranks rather than levels (Chetty et al., 2014; Haider & Solon, 2006; Nybom & Stuhler, 2017). Instrumental variable estimation has also been shown to reduce attenuation bias, using instruments that are correlated with parental lifetime incomes such as industry, occupation, highest qualification, race, or location (Mulligan, 1997; Zimmerman, 1992).

In our study, we reduce the impact of measurement error in parental earnings by using three years of earnings data, by relying on ranked earnings measures, and with an instrumental variables estimation approach. We instrument for parental earnings with instruments based on estimated worker-specific fixed effect from a two-way fixed effect model of monthly earnings obtained from linked employer employee data (Abowd et al., 2002; Maré & Hyslop, 2006). Worker fixed effects provide a time-invariant measure of each worker's relative earnings over all years where they are observed with earnings, controlling for age variation and the premium paid by firms in which they work. It is thus an alternative noisily measured estimate of parental lifetime earnings. Under the assumption that the measurement errors are uncorrelated between the estimated worker fixed effects and the ranked earnings measure, and that both are correlated with the true underlying earnings, the worker fixed effects can be used as an instrument to reduce the attenuation arising from measurement error.

Steady State ranks are calculated from equation (1), combined with pooled mean ranks for parents and children:

$$R_{SS} = \frac{\left(\bar{R}_C - \hat{\beta} * \bar{R}_P\right)}{\left(1 - \hat{\beta}\right)} \tag{2}$$

We also present estimates of *covariate-adjusted* persistence, to gauge the extent to which persistence reflects intergenerational persistence in observable characteristics such as education, location, or access to job networks. We combine insights from ranks of *residual* earnings and from multivariate rank-rank regressions that include measures of parent and child characteristics. We summarise residual ranks and rank-rank coefficients from various specifications that include different sets of characteristics. Residual ranks are estimated by first regressing (log) earnings on personal characteristics (X_i), separately for parents and for children, as in equation (3).

$$\ln Y_i = a_{ij} + X_i b_i + u_i \tag{3}$$

where *i* denotes either children or parents and *j* again denotes cohort-specific intercepts. The residuals from this equation (u_i) are then ranked, to provide covariate-adjusted (*X*-adjusted)

rankings $\left(R_{i,X}\right)$. If a group has high earnings ranks due to high levels of education, their education-adjusted rank would be lower than their raw earnings rank.

Adjusted rank-rank coefficients are obtained from estimates of equation (4).

$$R_C = \alpha_j + \tilde{\beta} * R_P + X_C\gamma_C + X_P\gamma_P + e_R \quad (4)$$

The estimated coefficient ($\hat{\tilde{\beta}}$) is combined with mean covariate-adjusted ranks to calculate covariate-adjusted steady-state ranks, as shown in equation (5).

$$R_{SS,X} = \frac{\left(\bar{R}_{C,X} - \hat{\tilde{\beta}} * \bar{R}_{C,X}\right)}{\left(1 - \hat{\tilde{\beta}}\right)} \quad (5)$$

5.2 Characteristics of the Earnings Rate sample

This section provides descriptive information on the children and parents included in the intergenerational Earnings Rate sample. Table 7 provides the gender breakdown of the children and parents in the sample. Just over half (52 percent) of the children in the analysis were male compared with 60 percent for the linked parents. The over-representation of males among identified parents reflects the choice to link children to their highest earning parent.

Table 8 provides the median child and parental earnings (in 2022 dollars) for selected percentile ranks. Across all ethnicities, median real earnings at the 50th percentile is almost identical for parents and children. Median earnings for children in 2022 were higher than that of their parents for the lower half of the distribution (till around the median) but the reverse is the case at the top of the distribution especially at the highest percentile. Overall, the child earnings distribution is more compressed than that of the parents. The ratio of the 80th percentile to the 20th percentile is 2.1 for children and 2.7 for their parents.

There are clear differences across ethnic groups in median earnings for both children and parents, although these differences are small relative to the degree of within-ethnicity earnings variation. Among parents, all ethnic groups (based on child ethnicity) other than European and 'Other' have median earnings that are around 90% of the overall median. Among children, median earnings for Māori and Pacific ethnic groups are also around 90% of the overall median but in contrast to their parents, Asian children have relatively high earnings (112% of the overall median) and MELAA children have close to overall median earnings (97%). The lowest within-group variation is evident for Pacific children and their parents, though it is still substantial, with an 80/10 ratio of 1.9 for children and 2.3 for parents. These patterns are also evident in Figure 2, which plots monthly earnings distributions for parents (panel a) and children (panel b), for each

ethnic group. Among parents, the distributions for parents of Māori, Pacific, Asian, and MELAA children all peak clearly to the left of the European and 'Other' groups. For children, distributional peaks for Asian and MELAA groups are close to those of European children.

The contrast between parental earnings and child earnings within each ethnic group is captured in Figure 3, which shows that ratio of child earnings to the earnings of their parents. The proportion of children who, at around age 30, were earning more than their parents were when the child was around 15 varies by ethnicity. The proportion is around 40% for European, Māori and 'other ethnicity' children, 70% for Pacific and MELAA children, and over 90% for Asian children. The median earnings rate for Asian children is 27% above that of their parents. For Pacific and MELAA children, the child-parent difference in median earnings is around 5-6%. These patterns of real earnings growth across a generation should be kept in mind when interpreting the changes in relative earnings ranks.

Table 9 summarises the distributions of parent and child earnings in terms of the rank statistics that we use for estimation (R_P and R_C in equation (1)), based on rankings within the national earnings distribution. This reflects the same differences in medians and substantial within-group earnings rank variation that are evident in Table 8 and Figure 2.

5.3 Intergenerational Earnings Persistence

In this section, we report estimates of intergenerational earnings persistence, using a rank-rank regression specification as shown in equation (1). Unless otherwise stated, ranks are calculated based on the national cohort-specific earnings distributions for children or, separately, for parents. Estimating ethnicity-specific regressions using national rankings provides an *absolute* persistence measure, in the sense of revealing whether, conditional on parental ranks, some groups of children have experienced stronger improvements in ranked earnings than others. This approach has been used in examining intergenerational mobility by race and by location in the US (Chetty et al., 2016, 2020) and Australia (Deutscher & Mazumder, 2020). Figure 4 presents the average earnings rate rank of children by each parent earnings rate rank. The figure shows a somewhat flat relationship between children and parent rank at the bottom of the distribution up until around the 50th percentile, beyond which there is a clear upward trend. Approximating the relationship using a linear model (Table 10), we find a slope coefficient of 0.16. This implies that a 10-percentile difference in parental income rank is associated with a 1.6 percentile difference in their child's expected income rank.

As discussed above, various forms of measurement error lead to a downward bias in estimated persistence. The second panel of Figure 4 plots the adjusted relationship between parental and child earnings, based on the variation used to identify instrumental variables estimates of persistence. The projection of earnings ranks onto the rank of worker fixed effects reduces the variation of parental earnings ranks, particularly at the upper and lower tails of the distribution, where a higher proportion of variation is likely to be due to transitory variation. As The resulting slope of the fitted line is steeper, with an estimated coefficient of 0.27, suggesting that the simple linear estimate of 0.16 was understated by around 40%.

The non-linearity that is evident in the upper panel of Figure 4 is altered by the IV transformation. The flat section in the lower half of the parental rank distribution is less pronounced, suggesting that the earnings of lower-earning parents are a noisy measure of their lifetime earnings levels. In contrast, the steepness of the relationship at the right of the figure remains, suggesting that the persistence of advantage is stronger than the persistence of disadvantage across generations.

The figure includes a dashed diagonal line, which traces out the points where parent rank and child rank are equal. For the national distribution shown in Figure 4, this crosses the fitted (linear) line at the mean rank of 50.5[17] for parents and children. Because the rank-rank coefficient is less than one, the children of above-average ranked parents have higher-than average ranks among children but are on average lower-ranked than their parents. There is, of course, considerable variation in child ranks around the fitted line. The fitted relationship captures only about 1-2% of the variation in child earnings ranks. Nevertheless, a slope of the fitted line that is less than one implies an expected compression of earnings variation between generations. A slope of 0.27 implies that variation in predicted child ranks is only 27% as large as the variation in parent ranks – or that inequality between families or between ethnic groups would be reduced by almost three-quarters within a generation if inequality were due solely to within-family intergenerational persistence.

Appendix Figure A1 presents an analogous figure for the logged level of earnings (i.e.: not based on ranks). The impact of instrumenting is more striking, consistent with transitory variation and measurement error having a greater effect on earnings levels than on earnings ranks. The slope of the relationship between ln(child earnings) and ln(parent earnings) more than doubles, from 0.09 to 0.20 due to the reduced impact of measurement error.

17. Ranks are from 1 to 100, so the mean is 50.5.

Figure 5 presents rank-rank scatter plots for each ethnic group, using ranks of the national earnings distribution.[18] The figure uses IV-adjusted parent ranks, obtained by projecting the actual rank onto the (worker fixed effect) instrument, and thus shows the slopes that are estimated from instrumental variables (IV) estimation. The IV regression estimates are shown in panel (b) of Table 10. The slopes of the fitted lines are broadly similar, ranging from 0.18 for Asian children to 0.31 for Māori children.

The fitted lines are plotted together in the top panel of Figure 6, showing variation in both relative and absolute intergenerational persistence. The figure also shows, as circles, the combination of observed mean parental and mean child ranks for each ethnic group (see Table 9). The earnings gap between Māori and Pacific groups and the overall distribution are evident. Conditional on parent rank, the mean ranks for Māori and Pacific children lie below those for the overall population in all parts of the distribution. In contrast, for the Asian and the small 'Other' ethnic group conditional child ranks are uniformly high. Furthermore, For the Asian ethnic group, the combination of parent and child mean ranks is clearly far from the steady state rank, consistent with strong upward rank-mobility between generations.

5.3.1 Relative persistence

Table 10 reports the rank-rank slopes as estimated by a linear model for both the overall and sub-group analyses. Individuals can belong to more than one ethnic group so the sum of children in each ethnic group exceeds the overall number of children. Child and parent earnings are ranked separately, and independently for each birth cohort. Ranks are based on the national earnings distribution, pooled across all ethnic groups. Panel (a) of Table 10 reports IV estimates of intergenerational earning persistence. Compared with an overall coefficient of 0.266, relative persistence is highest for Māori (0.309) and lowest for the Asian group (0.179). Estimates for MELAA and the 'other' group have relatively large standard errors, so estimated persistence for them is not statistically significantly different from that of Europeans. The proportion of the variation in child earnings ranks that is statistically accounted for by parental ranks is low in all cases (adj.R^2 between 0.5% to 2.1%), showing that there is considerable independent variation in child outcomes.

For comparison, the remaining panels of Table 10 show the OLS estimates of equation (1) which, as discussed in section 5.1 are biased towards zero (panel (b)), and IV estimates of the

[18]. The slopes are estimated based on 100 ranked bins. The figures display the relationships for 50 bins for European and Māori children, and for 20 bins for other ethnicities. Data are suppressed in the figure for some small bins.

intergenerational earnings elasticity (IGE) (panel (c)). The IGE is estimated as the coefficient on ln(real parental earnings) in a regression of ln(real child earnings) using an equation analogous to equation (1). The instrument in this case is an estimated worker fixed effect, as described in section 5.1. The pattern of differences across ethnic groups in panels (b) and (c) is similar to the pattern evident for the main (panel (a)) specification. The OLS estimates are 35% to 45% lower than the IV estimates, and the IGE estimates are 20% to 40% lower than the rank-rank IV estimates.

The rank-rank estimates in panel (a) of Table 10 are similar to estimates obtained using group-specific ranks (Appendix Table A8), although using national ranks provides additional information on absolute persistence. (Group-specific ranks, by construction, have the same median rank for each group, and for both parents and children.) Similar estimates are also obtained measuring child incomes at different ages – either for pooled birth cohorts, or for a single cohort (Appendix Table A7), suggesting that estimates are not sensitive to our choice to focus on child incomes at age 30.

Previous studies of intergenerational income and earnings persistence have found that the degree of earnings persistence differs for sons and daughters, with effects also varying depending on whether father's or mother's earnings are used. OECD (2018) reports variation across OECD countries, with the overall pattern being one of slightly higher persistence of fathers' earnings to daughters than to sons.[19] Previous New Zealand studies have found that fathers' income or earnings are more strongly related to sons' rather than daughters' earnings (Brown, 2022; Gibbons, 2010; Iusitini, 2022).[20]

Our main estimates, as shown in Table 10 use the parental monthly earnings rate of the highest-earning parent, who may be male or female.[21] To investigate the gender dimension of parent-child earnings persistence, we identify separately the highest-earning male parent ("father") and the highest-earning female parent ("mother"), and estimate persistence of parental income to sons and daughters. Table 11 summarises the sample sizes used for estimating gender-specific persistence, together with the proportion of sons and daughters associated with both a qualifying mother and a qualifying father (% dual parent). The table also shows the number

[19]. The daughter-son difference becomes small when adjustment is made for daughters' likelihood of being employed (OECD, 2018, Figure 4.17).

[20]. Gibbons (2010 Table 3) reports a father-son IGE of 0.32 and a father-daughter IGE of 0.27. Iusitini (2022, Table 11) reports IGE's for father-son (0.24), father-daughter (0.14), mother-daughter (0.15) and mother-son (0.05). Brown (2022, Fig 3) reports rank-rank coefficients on parental income of 0.23 for sons and 0.22 for daughters, including both parents.

[21]. The number of children or parents with non-binary gender reported in the administrative data is extremely small, which precludes separate analysis.

and proportion of children who identify with an ethnicity reported by their highest-earning parent.

Estimates of relative earnings persistence for combinations of parent and child genders are summarised in Table 12. Compared with the overall results from Table 10 (shown in the top row), there is stronger persistence for daughters than for sons. For all ethnicities combined, the rank-rank coefficient is 0.30 for daughters and 0.25 for sons. For both sons and daughters, there is stronger persistence from fathers than from mothers, with mother-son persistence being lowest, at 0.11. These patterns also hold for each of the ethnicity groups, with only two exceptions – mothers' earnings are more strongly linked to earnings of Pacific and Asian daughters than are fathers' earnings. Persistence is strongest for Māori for each of the mother/father and son/daughter combinations. Conversely, Asian children experience relatively weak intergenerational earnings persistence for all gender combinations.

The final row of Table 12 reports estimates of persistence for cases where children and parents have at least one ethnicity in common. Given that 97% of all children share an ethnicity with their parent, it is unsurprising that the 'shared ethnicity' estimate of 0.264 is very close to the 'all children' estimate of 0.266. By child ethnicity, there are some differences between the pooled and `same ethnicity' estimates, but only for European children is the difference statistically significant. Among European children, there is greater mobility (lower persistence) for those with European parents.

5.3.2 Absolute persistence

We turn now to a discussion of absolute persistence – whether children of different ethnicities face different expected earnings ranks conditional on their parent's earnings rank. As illustrated in Figure 6, the predicted rank-rank relationships for different ethnic groups are at different heights. The height of the fitted lines can be evaluated at different points in the parental rank distribution, to give a *conditional expected rank* (CER) measure (Deutscher & Mazumder, 2023). Table 13 reports CER measures for all parent-child pairs, and for each ethnic group. The CER25 row in panel (a) shows that the children of parents with earnings at the 25th percentile of the parental earnings distribution will, on average, reach the 44th percentile of the child earnings distribution. The lower panel shows the deviation of CER measures for each ethnic group compared with the overall distribution. The most pronounced deviations are evident for children of lower-ranked parents. For Māori children with parents ranked at the 25th percentile, the average expected rank is 36 (8 percentile ranks lower than overall) and for Asian children, it is 55

(11 percentile ranks above the overall). Table 13 also includes measures of steady state (SS) rankings for each ethnic group. The SS levels are generally similar to the CER50 levels and identify the same ordering of group-level absolute persistence.

Figure 7 provides a visual summary of steady state patterns following the presentation in Chetty et al (2020).[22] Each group is aligned on the horizonal axis with their steady-state rank. The mean parent rank for each group and the mean child rank for each group are plotted against the vertical axis, with a line connecting the parent rank for each ethnic group with a 45-degree line. The mean child rank lies between the mean parent rank and the 45-degree line due to the fact that all rank-rank coefficients are smaller than 1. The most striking feature of the graph is the substantial positive intergenerational mobility for Asian children, leading to a high implied steady-state rank of 62. There is also upward mobility for MELAA, Pacific, and 'other' ethnic groups.

European and Māori children have lower average ranks in the child earnings distribution than their parents had in the parent distribution. This is in part due to the strong upward mobility of Asian children. Measuring earnings mobility in terms of ranks means that if one group moves up in rank, some other groups must move down – a feature that Jenkins (1987) describes as 'exchange mobility'. In the following section, we investigate the extent to which steady state rank differences for different ethnic groups reflect persistent differences or changes in observable characteristics.

5.3.3 Covariate-adjusted earnings persistence

The strength of relative intergenerational persistence may reflect the fact that parents and children have similar earnings-related characteristics. In this section, we examine the extent to which such similarities can account for persistence within ethnic groups, or for inter-ethnic differences in the rate of persistence. We also examine whether inter-group differences in earnings-related characteristics can account for inter-group variation in steady state ranks. Covariate-adjusted steady state ranks provide an indication of whether steady-state differences would remain even if observable characteristics were similar across groups. We report estimates of covariate-adjusted relative and absolute persistence based on estimates of equation (4), with covariate-adjusted steady-state ranks based on equation (5).

We consider a limited range of characteristics that are observed for both parents and children, as summarised in Table 14. The most substantial variation across ethnic groups relates

[22] The underlying numbers are shown in panel (a) of Table 15.

to qualifications and location. Among parents, 21% have a degree qualification but this proportion is much higher for parents of Asian (37%) and MELAA (31%) children, and relatively low for parents of Māori (14%) and Pacific (12%) children. The differences are even more pronounced among the children. Overall, the children have a higher qualification mix than parents, with 36% of children having a degree qualification. Qualifications are particularly high for Asian children, with almost two-thirds (65%) having a degree qualification. The proportion of Māori and Pacific children with a degree qualification is relatively low (21%), albeit at the same level as the proportion for parents overall. The strongest locational differences across ethnic groups are apparent in the proportion of parents and children living in Auckland. Compared with an overall proportion of 27%, 65% of the parents of Asian children, and 63% of the parents of Pacific children, live in Auckland. Parents of Māori children were the most likely to be living outside a main urban area (34%). Location patterns for children are very similar to those of their parents.

The final block of summary statistics in Table 14 relate to the firm pay level for firms in which parents or children are employed. A firm-specific pay premium is estimated from the same two-way worker and firm fixed effects model from which the worker fixed-effect instruments are derived (See section 5.1). The firm-pay-level measure captures whether parents or children work in firms that would generally pay relatively high or low wages to their employees. It thus provides a measure of differential access to high-paying employers. Among parents, parents of Pacific children have the highest median firm premium (3% above the average firm)– in part reflecting the effect of living in Auckland, where wages are generally higher. However, despite having a similar presence in Auckland, parents of Asian children do not disproportionately work in high-paying firms (median of 1% below average). In contrast, Asian children themselves do work in higher paying firms, with a median firm premium of 5% above average, and a quarter of Asian children working in firms paying 14% or more above average. Firms employing Māori children are relatively low-paying firms - median of 5% below average, and upper quartile of only 5% above average, compared with an overall upper quartile of 8% above average.

These differences (between ethnic groups) have the potential to alter the ranking of parents and of children in their respective earnings distributions. The altered rankings are documented in Table 15. The upper two panels of Table 15 (a and b) show the mean rankings, adjusted for different sets of covariates, together with the raw rankings as reported in Table 9. The lower two panels (c and d) show how each mean differs from the raw mean. As shown in the final row of panels c and d, controlling for all listed characteristics has the greatest effect on child rankings –

raising the ranking of Māori children by 3.9 percentile ranks and lowering the mean rank of Asian children by 8.9 ranks. For Asian children, controlling for their relatively high qualifications, their over-representation in Auckland, and their being disproportionately employed in high-paying firms (which also captures the effects of being in Auckland) each lowers their rank by 3 to 6 places. The covariate-adjusted rank of Māori children is raised by 2.1 places when controlling for the fact that they have lower average qualification levels than non-Māori. The effect of qualifications for Pacific children is similar (2.3 places), though this is offset by controls for being disproportionately in Auckland, where wages are higher, and being in high-paying firms.

Table 9 shows that adjusting for covariates has a material effect on the rankings of both parents and children. It could thus potentially affect the expected rank of children conditional on their parents' ranks (absolute and steady state persistence). It could also affect the (relative persistence) relationship between parent rank and child rank, depending on how their adjusted ranks are related. Table 16 reports estimates of covariate-adjusted rank-rank coefficients ($\hat{\tilde{\beta}}$ in equation (4). The lower panel of Table 16 shows the extent to which estimated relative persistence is reduced by controlling for each set of covariates. With the exception of demographic controls, which slightly increase estimated persistence for European and 'Other' ethnic groups,[23] all other controls reduce the estimated persistence.

The pattern of effects is similar across ethnic groups. For all groups, qualification controls and controls for firm-level pay variation are the two most influential sets of controls, reducing coefficients by 0.06 to 0.12. These reductions imply that intergenerational persistence of qualification levels and of employment in well-paying firms make a substantial contribution to intergenerational earnings persistence. Furthermore, they are similarly important factors within all ethnic groups, contributing to the perpetuation of within-group earnings inequality. The combined effect of all covariates (shown in the final row) is to reduce the rank-rank coefficient by between 0.12 and 0.19. The findings here reflect the findings of Gibbons (2010, Table 2), who finds that controlling for qualifications halves estimated income persistence, and the findings from other studies that have documented intergenerational education persistence in New Zealand (Brown, 2022; Maré & Stillman, 2010).

Controlling for observable characteristics has an even more substantial effect on estimates of absolute convergence. As described in section 5.1, we calculate covariate-adjusted steady-state

[23]. The increases could be a result of some slight further reduction in attenuation bias (beyond what is removed through the use of IV estimation), achieved by controlling for the effect of measuring parental earnings at different ages.

ranks based on the coefficients in Table 16 and the covariate-adjusted mean ranks shown in Table 15 (See equation (5)). The resulting estimates of adjusted steady-state ranks are shown in panel (a) of Table 17. Panel (b) reports the difference between the raw SS rank (as shown in Table 13) and each of the covariate-adjusted estimates. The bottom row of Table 17 shows the effect of controlling for all covariates. The adjusted SS rank for Māori is 4.9 places higher than the raw, and for the Asian ethnic group, the adjusted SS rank is 11.8 places lower – at 49.9 instead of 61.7. The strongest contributions to these changes are again from qualification and firm pay controls. The high child rank of Asian children, conditional on their parents' ranks, is strongly associated with the children's high level of qualifications. Controlling for this lowers their (adjusted) steady-state rank by 6 places, and controlling for firm pay premiums alone lowers it by 8.2 places. For Māori and Pacific children, qualification controls raise the covariate-adjusted steady state rank, as it removes the earnings-lowering effect of low average qualifications.

The lower panel of Figure 6 graphs the patterns of covariate-adjusted relative and absolute intergenerational persistence. The lines are much flatter than in the raw graph in the upper panel (due to lower relative persistence), and the equalising effect of covariate adjustments on absolute persistence is evident in the closeness of the lines in the lower panel. Across ethnic groups, the covariate-adjusted steady states range from 44.1 (Pacific) to 52.5 (Other ethnicities) – a much smaller range than the 41.3 (Pacific) to 61.7 (Asian) range of unadjusted steady-states.

Figure 8 provides an alternative summary of steady state patterns, analogous to Figure 7, but showing what the steady-state ethnic gaps would be if all ethnic groups had the same observable characteristics, and a common relationship between covariates and ranks. The re-ordering of steady states is clearly evident. European and 'Other' ethnic groups have the highest covariate-adjusted steady states, the rank of Māori would be higher, and the steady-state rank of the Asian ethnic group would be lower. This provides a clearer indication of whether different ethnic groups face different earnings prospects conditional on their parental earnings and on observed covariates.

6 Summary and discussion

Our study was motivated by questions about the impact of racism and discrimination in the labour market. Our findings on intergenerational earnings rate mobility imply a differential pattern of mobility across ethnic groups. We have presented three main sets of findings that highlight

different aspects of these inter-ethnic differences – relative persistence (rank-rank coefficients); absolute persistence (steady state gaps) and covariate-adjusted persistence.

We have focused on the persistence of earnings rates, which is a different focus from most previous New Zealand studies of persistence, which have dealt with persistence in incomes, education, or social class. The overall degree of intergenerational persistence that we estimate for New Zealand is similar to that of other OECD studies for which rank-rank correlations are available (Iusitini, 2022, p. 131).[24] Our estimates are, however, based on instrumental variables (IV) estimation, which removes a downward bias that is present in international studies. Our 'raw' estimate of 0.16 is more comparable, suggesting that earnings persistence in New Zealand may be relatively low.

Our IV estimates show an overall rank-rank coefficient of 0.27, which implies that over three quarters of inter-family (or inter-group) earnings inequality would be expected to dissipate within one generation if inequality were due solely to within-family persistence. Within-family earnings persistence is not a dominant cause of persistent inter-ethnic pay differences or of earnings inequality within ethnic groups.

This does not mean that poor (or highly favourable) parental outcomes are inconsequential for the outcomes of their children. It is well-established that experience of hardship while a child can have adverse impacts on adult outcomes. Recent New Zealand studies have found poor adult outcomes due to exposure to childhood poverty, material hardship, maltreatment and parental incarceration.[25] An insight from the current study is that not all children of low-earning parents are as adversely affected – at least in terms of their own subsequent earnings rates. Targeting assistance based on poor parental earnings will be imperfect, raising the costs of ensuring "a fair chance for all".

The patterns in Figure 4 and Figure 5 suggest stronger earnings persistence from higher-earning parents to their children than from lower-earning parents to their children. This implies that the transmission of advantage is a stronger factor in perpetuating inequalities within and between ethnic groups than is the transmission of disadvantage. Previous studies and debates focusing on 'intergenerational welfare participation' and 'persistent cycles of persistent

[24] Our IGE estimate of 0.20 is relatively low by international standards. Both Corak (2016) and OECD (2018) cite a father-son IGE in New Zealand of 0.29 (sourced from Gibbons (2010)). This compares with an OECD average of 0.38 (OECD, 2018, p26). The estimated father-son rank-rank coefficient in our Table 12 is 0.26. The rates of persistence that we estimate are similar to those found Brown (2022) for intergenerational income persistence (0.23) using similar data.

[25] See Ministry of Social Development (2018), Productivity Commission (2022, 2023), Morreau and Low (2023) Lambie & Gluckman (2018)

disadvantage' have been more concerned with persistence of lower incomes, for which we estimate comparatively low persistence (Maloney et al., 2003; New Zealand Productivity Commission, 2023). Low persistence of low incomes (and low education) was also found by Bratsberg et al (2007) in Nordic countries, which they suggest may be related to those countries' egalitarian education policies.[26] Brown (2022) finds a similarly stronger persistence of high education compared with low education within New Zealand, but not of high incomes.

When looking across ethnic groups in New Zealand, we find that relative persistence is lowest for the Asian ethnic group (0.18), and highest for Māori (0.31) and MELAA (0.29) groups. Even for groups with comparatively high levels of relative persistence, however, there is still considerable intergenerational mobility. A rank-rank coefficient of 0.3 implies that within-group inequality would decline by more than two-thirds if intra-family persistence alone were perpetuating inequality. Sustained ethnic pay differences clearly indicate that there are other longer-term and systemic factors at play. For Māori, Pihama et al (2014, p.259) refers to "the complexities of Māori experiences of <historical> trauma and intergenerational transmission". Our findings suggest that the transmission is not intergenerational, in the sense of passing from parents to children within families, but multigenerational - affecting successive generations of Māori.

Ongoing ethnic pay differences are also evident in measures of absolute intergenerational persistence. Conditional on parental income rank, Māori and Pacific children have lower expected earnings ranks than average. In contrast, Asian children have high expected earnings ranks. As summarised by the steady state rank, which has an expected value of 50.5 overall, the steady state for Māori is 41.3 and for Pacific is 44.5. The steady state for the Asian ethnic group is 61.7. These are the ranks that each group would converge to if the observed intergenerational patterns were repeated across many generations. Because the steady states are based on ranks, a higher-than-average steady state rank for one group inevitably leads to a lower-than-average steady state rank for at least one other group. Steady state ranks should therefore be interpreted in conjunction with measures of real intergenerational earnings growth, as shown in Figure 3. Around forty percent of Māori and European children earn more than their parents. For Pacific and MELAA children the figure is around 70% and for Asian children it is over 90%.

[26] Bratsberg et al (2007) note that measurement error in parental earnings can generate low estimated persistence – especially at lower incomes (they reject this as an explanation for their findings). Our instrumental variables estimation serves to reduce such bias in our estimates (see Figure 4).

This pattern highlights two points that should be reiterated about the interpretation of steady state ranks. First, a low steady state rank for an ethnic group can arise even when all children are improving their earnings-related characteristics. Strong improvements for one group raise their rank but this can only be achieved by lowering ranks of other groups. Second, the term 'steady-state' should not be taken too literally. As discussed in section 5.3.2, the steady state rank is a useful summary measure of the combined effect of relative and absolute persistence, it does not necessarily indicate the future prospects facing a group. The steady state rank captures the expected rank for a group if the same parent-child differences in earnings were repeated for many generations. However, this is unlikely if there are substantial advances made in a particular generation, as is observed in our data for Asian children, which will not necessarily be repeated in subsequent generations.

Our findings based on covariate-adjusted estimates of intergenerational earnings persistence highlight some of the reasons for ethnic differences in relative and absolute persistence and shed light on the factors that serve to perpetuate inequality within ethnic groups and between ethnic groups. The greatest share of the intra-family persistence is associated with persistence of observed earnings-related characteristics rather than persistence of overpayment or underpayment for those characteristics. The most prominent sets of persistent characteristics are qualifications, and employment in high-paying firms. The latter could reflect a range of factors, including discrimination in hiring that similarly affects both parents and children, access to different social and job-networks, or living in different labour markets. Within-family persistence of qualification levels could also reflect myriad factors, including systemic racism within the education system, or differences in resources to support educational investment.

Within-family persistence of qualifications across parents and children, and persistence in being employed in well-paying firms play a substantial role in perpetuating earnings inequality within all ethnic groups. Controlling for our full set of observed characteristics reduces estimated relative persistence by more than a half, with reductions in the range of -0.13 to -0.19. For all ethnic groups combined, the reduction is by 57% (from 0.266 to 0.152).

Adjusting for observable characteristics has an even more substantial impact on estimates of absolute persistence, with the strongest impacts on the implied steady state ranks of Asian and Māori ethnic groups. The raw steady state estimate for the Asian ethnic group is a rank of 61.7, whereas the covariate-adjusted rate is 49.9. This implies that the high earnings rank of Asian children conditional on their parent's earnings rank can largely be accounted for by the children's

relatively favourable observed characteristics – particularly higher qualifications, likelihood of being employed in high-paying firms, and location. For Māori, adjusting for covariates raises the estimated steady state rank – from 41.3 to 46.2, reflecting the relatively low ranking of their earnings-related characteristics. Even though Māori children – like all ethnic groups – were on average more highly qualified than their parents, the differences for Māori children were not as pronounced as they were for Asian children.

Finally, our covariate-adjusted steady state ranking estimates show a pattern of inter-ethnic pay differences that reflects longer term patterns of advantage and disadvantage more clearly than the unadjusted estimates. Children from the European ethnic group earn relatively more, conditional on their parents' earnings and their earnings-related characteristics, than Asian, MELAA, Māori, and Pacific children. The high unadjusted steady state rank for the Asian group reflects advantageous qualifications and access to well-paying firms, without which their steady-state rank would be well below that of Europeans. For Māori, disadvantageous patterns of qualifications and location result in a low unadjusted steady state rank. However, even adjusting for these patterns, Māori steady state earnings rates are relatively low, potentially reflecting current or historical racism.

The substantial improvements in qualifications achieved by Asian children even compared with their relatively highly qualified parents, is encouraging for the speed of earnings rank mobility that can be achieved within a generation, even in the presence of racism and discrimination.

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Tables and Figures

Table 1: Summary of New Zealand literature on intergenerational mobility of income

Authors	Study	Data Source	Measure	Findings	Method	Coverage	Ethnic Dimension
Andrews and Leigh (2009)	More inequality, less social mobility	Survey Data: 1999 Social Inequality III module of ISSP	Earnings (proxied by occupation)	Son-father IGE of 0.245. intergenerational correlation of 0.191 (Estimates from Andrews and Leigh (2008))	IGE and IG correlation	Limited to Father-Son	No
Gibbons (2010) (used in OECD, 2018)	Income and Occupational Intergenerational Mobility in NZ	Longitudinal income data from the Dunedin birth cohort Study (born 1972-73); and occupation-based SES using the 1996 Election Study	Income and SES(Occup)	Offspring-parents IGE of 0.272, offspring-father IGE of 0.264, son-father IGE of 0.290, daughter-father IGE of 0.215	Intergenerational income elasticity	Various models including gender-specific	Yes (for SES)
Iusitini (2022)	Intergenerational income mobility in New Zealand	Longitudinal: Linked Census and Christchurch Health and Development Study (Christchurch birth cohort born 1977)	Income	Permanent income estimates of IGM: range from 0.05 for Son-mothers to 0.24 for Son-Fathers. Childhood resources estimates of IGM: 0.479 (0.533 for sons, 0.412 for daughters)	Multiple: IGE; rank coeff; transition matrices	Various models including gender-specific	Yes, but limited sample sizes
Brown (2022)	Intergenerational Income Mobility in New Zealand	Administrative Data: Birth Records of children born in NZ between 1985/86-1991/2 (requires incomes for 2 parents)	Income and Qualification	Rank-Rank slope of 0.23. Intergenerational mobility similar for males and females	Rank-Rank regressions	Various models including gender-specific	No
So (2023)	Thesis Chap 1: The geography of income mobility and income inequality in NZ	Longitudinal Census Data 1981-1996	Income	IGE of 0.28	Intergenerational Income Elasticity	Fathers and sons	No
Jenkins & Crichton (2024)	Stuck or Soaring? Regional differences in upward economic mobility across Aotearoa NZ	Administrative Data: Birth Records of children born in NZ between 1986-94	Income	Rank-rank coefficients: Pakeha=0.20; Māori = 0.26 Variation across SA3 and TA geographies	Rank-rank coefficients; CER25		Yes

Table 2: Sample selection - Numbers of children and parents

Sample	# distinct Children	# distinct Parents
Universe of children born from 1986-1992 with non-missing income data at ages 29-31, and of parents observed near the child's 15th birthday	387,351	688,059
Employment sample • One observation per child. Non-missing parental income when the child was aged 14-16 (keep highest earning parent)	288,048	217,368
Earnings Rate sample: • Both child and parent earn positive wage and salary earnings for 6+ months in at least one year in a 3-year window. Drop top and bottom 1% of sample.	198,102	158,847

Note: Counts are for analyses centred on when the child was aged 30. Table A2 provides counts by birth cohort for the Employment and Earnings Rate samples

Table 3: Intergenerational persistence in income source (All cohorts–Employment Sample)

	Parent category (when child was 15)						
	WAS Only	WAS + Social Assist.	WAS + Other	Non-WAS	Missing	Total	Share
Child category (age 30)							
WAS Only	**127,206**	23,112	8,046	5,916	6,444	170,724	59%
WAS + Soc. Assist.	23,952	**10,815**	1,530	2,541	1,149	39,987	14%
WAS + Other	6,540	1,371	**591**	432	330	9,264	3%
Non-WAS	22,794	11,385	1,602	**3,195**	1,227	40,203	14%
Missing	19,320	4,497	1,431	1,341	**1,284**	27,873	10%
Total	199,812	51,180	13,200	13,425	10,434	288,048	100%
Share	69%	18%	5%	5%	4%	100%	
			Relative Risk				
WAS Only	**1.07**	0.76	1.03	0.74	1.04		
WAS + Soc. Assist.	0.86	**1.52**	0.83	1.36	0.79		
WAS + Other	1.02	0.83	**1.39**	1.00	0.98		
Non-WAS	0.82	1.59	0.87	**1.71**	0.84		
Missing	1.00	0.91	1.12	1.03	**1.27**		

Note: This table based on a single year of data for each child (at age 30), and a single year of data for the top-ranked parent (when the child was aged 15). It combines information from all birth cohorts (1986-92). The Employment Sample is selected as having some income data in a 3-year period. Missing data in this table arise because it is calculated for a single year of child data and a single year of parent data.

Table 4: Income source persistence: Relative risk by category and ethnicity

		Child ethnicity					
	All	European	Māori	Pacific	Asian	MELAA	Other
WAS Only	**1.07**	1.05	1.15	1.08	1.03	1.11	1.04
WAS + Soc. Assist.	**1.52**	1.55	1.23	1.22	1.39	1.38	1.56
WAS + Other	**1.39**	1.36	1.56	1.37	1.07	1.29	1.54
Non-WAS	**1.71**	1.74	1.45	1.52	1.60	1.36	1.94
Missing	**1.27**	1.24	1.34	1.36	1.29	1.30	1.17
Total	1.11	1.08	1.18	1.11	1.05	1.16	1.06
% on diagonal	50%	52%	40%	44%	53%	37%	58%
Number of pairs	288,048	219,369	80,304	30,729	17,844	3,897	5,532

Note: The left column contains the diagonal entries from the lower panel of Table 3. The remaining columns show analogous statistics by child's ethnicity. The 'total' row shows the relative risk of child and parent being in the same category. Children who identify with more than one ethnicity contribute to more than one column. The total number of parent child-pairs is thus less than the sum of the number in each ethnic group.

Table 5: Intergenerational persistence in months paid: All cohorts – Employment Sample

	Parents WAS-months (when child was 15)					
	Zero	1-5 Months	6-12 Month	Missing	Total	Share
Children WAS-months (age 30)						
Zero	3,195	4,764	31,014	1,227	40,200	14%
1-5Months	1,626	2,787	22,488	975	27,876	10%
6-12Months	7,266	14,292	163,599	6,948	192,105	67%
Missing	1,341	2,424	22,818	1,284	27,867	10%
Total	13,428	24,267	239,919	10,434	288,048	100%
Share	5%	8%	83%	4%	100%	
			Relative Risk			
Zero	**1.70**	1.41	0.93	0.84		
1-5Months	1.25	**1.19**	0.97	0.97		
6-12Months	0.81	0.88	**1.02**	1.00		
Missing	1.03	1.03	0.98	**1.27**		

Note: This table based on a single year of data for each child (at age 30), and a single year of data for the top-ranked parent (when the child was aged 15). The Employment Sample is selected as having some income data in a 3-year period. Missing data in this table arise because it is calculated for a single year of child data and a single year of parent data.

Table 6: Persistence in months paid: Relative risk by months and ethnicity

		Ethnicity					
WAS-months	All	European	Māori	Pacific	Asian	MELAA	Other
Zero	**1.70**	1.75	1.45	1.52	1.61	1.36	1.86
1-5Months	**1.19**	1.19	1.13	1.19	1.09	0.93	1.17
6-12Months	**1.02**	1.02	1.04	1.03	1.02	1.03	1.01
Missing.	**1.27**	1.24	1.34	1.36	1.29	1.30	1.20
Total	1.03	1.03	1.06	1.04	1.03	1.04	1.02
% on diagonal	59%	62%	52%	56%	59%	44%	66%
Number of pairs	288,048	219,369	80,304	30,729	17,844	3,897	5,532

Note: The left column contains the diagonal entries from the lower panel of Table 5. The remaining columns show analogous statistics by child's ethnicity. The 'total' row shows the relative risk of child and parent being in the same category. Children who identify with more than one ethnicity contribute to more than one column. The total number of parent child-pairs is thus less than the sum of the number in each ethnic group.

Table 7: Gender distribution of parents and children (Earnings Rate sample)

Gender	Child	Parent
Male	52%	60%
Female	48%	40%
Total count	198,102	158,847

Table 8: Parent and child monthly earnings (in 2022$) (Earnings Rate sample)

Percentile Rank	All	European	Māori	Pacific	Asian	MELAA	Other
			Parent earnings (in 2022$)				
10	$1,678	$1,639	$1,553	$1,696	$1,374	$1,112	$1,561
20	$2,664	$2,773	$2,409	$2,557	$2,253	$2,086	$2,880
30	$3,471	$3,667	$3,149	$3,167	$2,927	$2,981	$3,968
40	$4,127	$4,364	$3,729	$3,664	$3,568	$3,736	$4,697
50	$4,745	$4,995	$4,281	$4,147	$4,216	$4,340	$5,328
60	$5,368	$5,639	$4,778	$4,663	$4,750	$5,142	$5,988
70	$6,118	$6,442	$5,393	$5,152	$5,437	$5,754	$6,950
80	$7,130	$7,447	$6,174	$5,801	$6,386	$6,805	$7,737
90	$8,818	$9,233	$7,434	$6,854	$7,694	$8,270	$9,424
100	$17,345	$16,427	$13,241	$9,833	$12,244	$13,495	$14,134
			Children Earnings (in 2022$)				
10	$2,231	$2,165	$1,882	$2,128	$2,569	$2,093	$2,283
20	$3,145	$3,185	$2,669	$3,014	$3,660	$2,995	$3,459
30	$3,757	$3,828	$3,254	$3,559	$4,288	$3,661	$4,114
40	$4,264	$4,361	$3,750	$3,973	$4,795	$4,108	$4,637
50	$4,746	$4,861	$4,198	$4,359	$5,334	$4,621	$5,121
60	$5,289	$5,421	$4,639	$4,733	$5,910	$5,183	$5,671
70	$5,883	$6,009	$5,167	$5,157	$6,573	$5,769	$6,257
80	$6,650	$6,778	$5,862	$5,726	$7,350	$6,458	$6,921
90	$7,852	$7,929	$6,926	$6,544	$8,586	$7,696	$8,066
100	$12,209	$11,663	$10,628	$8,866	$11,230	$10,793	$10,872
Observations	198,189	154,641	49,923	20,841	12,666	2,112	4,137
Share of total	100%	78%	25%	11%	6%	1%	2%

Note: Reported amounts are median values with a one-percentile bin. Shares sum to more than 100% because children identifying with more than one ethnicity are included in more than one ethnicity group.

Table 9: Distribution of earnings ranks in the national distribution (Earnings Rate sample)

	Child ethnicity is						
	All	European	Māori	Pacific	Asian	MELAA	Other
			(a) Parent rank distribution				
P25	26	28	22	25	20	20	30
Median	51	56	44	45	40	45	60
Mean	50.5	53.1	44.9	43.3	44.2	45.8	55.7
P75	75	80	66	65	70	75	85
			(b) Child rank distribution				
P25	26	28	20	25	35	25	35
Median	50	54	40	45	65	50	60
Mean	50.5	52.0	42.4	44.2	58.5	49.1	56.5
P75	75	78	64	65	85	75	85

Table 10: Linear rank-rank regression by ethnic group using national rankings (age 30)]

	Child ethnicity is						
Dependent var is	All	European	Māori	Pacific	Asian	MELAA	Other
Child rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(a) Rank-rank regressions (Instrumental variables estimation)						
Parental rank	0.266***	0.242***	0.309***	0.248***	0.179***	0.293***	0.211***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.012)	(0.030)	(0.020)
Constant	37.05***	39.52***	27.85***	32.59***	50.11***	38.21***	45.02***
	(0.240)	(0.273)	(0.463)	(0.743)	(1.010)	(2.452)	(1.590)
Adj. R-squared	0.013	0.009	0.021	0.009	0.009	0.006	0.005
	(b) Raw Rank-rank regressions						
Parental rank	0.157***	0.140***	0.190***	0.143***	0.115***	0.156***	0.119***
	(0.002)	(0.003)	(0.005)	(0.007)	(0.009)	(0.021)	(0.015)
Constant	42.56***	44.91***	33.14***	37.06***	52.93***	44.24***	49.87***
	(0.214)	(0.244)	(0.406)	(0.624)	(0.935)	(2.254)	(1.424)
Adj. R-squared	0.025	0.020	0.034	0.019	0.013	0.025	0.014
	(c) Intergenerational Earnings elasticity (Instrumental variables estimation)						
Ln(real earnings rate)	0.200***	0.185***	0.242***	0.182***	0.126***	0.177***	0.169***
	(0.003)	(0.003)	(0.006)	(0.010)	(0.010)	(0.023)	(0.016)
Constant	6.665***	6.805***	6.199***	6.736***	7.431***	6.916***	7.004***
	(0.021)	(0.024)	(0.050)	(0.084)	(0.079)	(0.187)	(0.136)
Adj. R-squared	0.018	0.014	0.029	0.030	0.026	0.009	0.020
Observations	198,102	154,653	49,950	20,841	12,651	2,103	4,152

*Note: Standard errors in parentheses, clustered by percentile of parent rank *** p<0.01, ** p<0.05, * p<0.1. Weak instrument tests reject weak identification (Cragg-Donald F-statistic>2000). The estimated constant reflects the intercept for the 1986 cohort.*

Table 11: Child and Parent gender and ethnicity links – observation counts

Child	Parent	Child ethnicity is						
		All	European	Māori	Pacific	Asian	MELAA	Other
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Daughter	All	95,214	75,366	23,442	10,074	6,102	924	1,638
Daughter	Mother	77,709	62,277	18,975	7,968	4,548	696	1,335
Daughter	Father	67,404	53,337	16,794	7,173	4,200	612	1,203
Daughter	% dual parent	52%	53%	53%	50%	43%	42%	55%
Son	All	102,885	79,287	26,508	10,767	6,549	1,179	2,514
Son	Mother	82,917	64,752	21,090	8,370	4,872	879	2,097
Son	Father	74,595	57,426	19,554	7,836	4,635	798	1,839
Son	% dual parent	53%	54%	53%	51%	45%	42%	57%
All	Shared ethnicity	191,895	140,691	34,629	16,170	10,311	714	798
All	% of full sample	97%	91%	69%	78%	82%	34%	19%

Note: Female parents are identified as the highest earning female parent and male parent as the highest earning male parent. Where two parents are observed, a child may appear in both a female parent count and a male parent count.

Table 12: Earnings persistence by gender and shared ethnicity (IV estimates)

Dependent var is	Child ethnicity is						
Child rank	All	European	Māori	Pacific	Asian	MELAA	Other
Pooled	0.266***	0.242***	0.309***	0.248***	0.179***	0.293***	0.211***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.012)	(0.030)	(0.020)
Daughter	0.301***	0.293***	0.355***	0.275***	0.193***	0.322***	0.301***
	(0.004)	(0.005)	(0.009)	(0.016)	(0.018)	(0.043)	(0.034)
Daughter & mother	0.222***	0.213***	0.252***	0.224***	0.170***	0.225***	0.231***
	(0.005)	(0.005)	(0.009)	(0.016)	(0.022)	(0.049)	(0.036)
Daughter & father	0.272***	0.284***	0.292***	0.178***	0.162***	0.317***	0.247***
	(0.004)	(0.005)	(0.009)	(0.015)	(0.018)	(0.045)	(0.035)
Son	0.246***	0.202***	0.293***	0.233***	0.164***	0.260***	0.149***
	(0.004)	(0.004)	(0.009)	(0.016)	(0.017)	(0.041)	(0.024)
Son & Mother	0.107***	0.0861***	0.162***	0.121***	0.0840***	0.121**	0.109***
	(0.004)	(0.005)	(0.009)	(0.015)	(0.021)	(0.045)	(0.026)
Son & Father	0.261***	0.230***	0.278***	0.204***	0.155***	0.231***	0.172***
	(0.004)	(0.004)	(0.008)	(0.014)	(0.017)	(0.042)	(0.025)
Shared ethnicity	0.264***	0.227***	0.306***	0.230***	0.186***	0.343***	0.130**
	(0.003)	(0.004)	(0.008)	(0.014)	(0.014)	(0.048)	(0.048)

Table 13: Absolute persistence summary measures

	Child ethnicity is						
	All	European	Māori	Pacific	Asian	MELAA	Other
	(a) Persistence measures						
Intercept (CER0)	37.1	39.5	27.9	32.6	50.1	38.2	45.0
CER25	43.7	45.6	35.6	38.8	54.6	45.5	50.3
CER50	50.4	51.6	43.3	45.0	59.1	52.9	55.6
CER75	57.0	57.7	51.0	51.2	63.5	60.2	60.8
Steady State (SS)	50.5	51.7	41.3	44.5	61.7	50.5	56.8
	(b) Deviation from overall persistence						
Intercept (CER0)	0.0	2.5	-9.2	-4.5	13.1	1.2	8.0
CER25	0.0	1.9	-8.1	-4.9	10.9	1.8	6.6
CER50	0.0	1.3	-7.1	-5.4	8.7	2.5	5.2
CER75	0.0	0.7	-6.0	-5.8	6.5	3.2	3.8
Steady State (SS)	0.0	1.2	-9.2	-6.0	11.2	0.0	6.3

Note: Measures are based on IV estimates of persistence, as shown in Table 10.

Table 14: Parent and child characteristics

	All	Euro	Māori	Pacific	Asian	MELAA	Other
			(a) Parent characteristics				
Demographics							
• % female	39%	38%	40%	42%	42%	42%	36%
• Mean age	29.2	29.5	27.0	28.0	30.1	29.0	30.1
Qualifications							
• % no qual	44%	42%	49%	59%	39%	37%	36%
• % degree+	21%	22%	15%	12%	37%	31%	26%
Ethnicity							
• % child's=parent's	97%	91%	69%	78%	82%	34%	19%
• % multi-ethnicity	11%	11%	27%	16%	8%	15%	17%
Location							
• Auckland	27%	21%	21%	63%	65%	39%	21%
• % main urban	45%	48%	44%	28%	28%	44%	51%
• % Other location	28%	31%	34%	9%	7%	17%	28%
Language							
• % English only	89%	92%	83%	80%	86%	84%	93%
• % te reo Māori	6%	3%	19%	6%	2%	4%	2%
Firm pay level							
• P25	-0.08	-0.08	-0.09	-0.07	-0.11	-0.09	-0.07
• P50	0.01	0.01	0.00	0.03	-0.01	-0.01	0.01
• P75	0.10	0.11	0.10	0.11	0.10	0.09	0.11
			(b) Child characteristics				
Demographics							
• % female	48%	49%	47%	48%	48%	44%	39%
• Mean age	30	30	30	30	30	30	30
Qualifications							
• % no qual	32%	30%	43%	45%	16%	31%	21%
• % degree+	36%	37%	21%	21%	65%	41%	46%
Ethnicity							
• % multi-ethnicity	21%	25%	65%	44%	28%	73%	74%
Location							
• Auckland	28%	22%	21%	62%	66%	39%	22%
• % main urban	46%	50%	47%	28%	28%	43%	52%
• % Other location	26%	28%	32%	9%	7%	18%	26%
Language							
• % English only	91%	92%	83%	84%	94%	48%	98%
• % te reo Māori	6%	4%	20%	5%	2%	2%	3%
Firm pay level							
• P25	-0.11	-0.11	-0.12	-0.09	-0.06	-0.10	-0.10
• P50	-0.02	-0.03	-0.05	-0.01	0.05	-0.02	-0.01
• P75	0.08	0.08	0.05	0.09	0.14	0.09	0.09
Observations	198,102	154,653	49,950	20,841	12,651	2,103	4,152

Table 15: Raw and covariate-adjusted ranks

	European	Māori	Pacific	Asian	MELAA	Other
			a) Mean parent ranks			
Raw	53.1	44.9	43.3	44.2	45.8	55.7
Demog controls	52.5	45.7	45.1	48.2	48.8	54.8
Qualification controls	52.9	45.7	45.4	42.3	44.5	54.6
Urban area controls	53.3	46.0	41.6	41.9	44.3	55.6
Language controls	52.6	46.2	44.3	45.0	46.3	55.0
Firm pay controls	53.5	44.3	39.9	45.2	46.7	55.8
All combined	52.5	47.3	44.0	45.6	46.7	53.5
			b) Mean child ranks			
Raw	52.0	42.4	44.2	58.5	49.1	56.5
Demog controls	52.1	41.9	44.1	58.7	48.4	55.5
Qualification controls	51.7	44.6	46.5	54.5	48.7	54.9
Urban area controls	52.2	43.8	42.5	55.3	47.3	56.5
Language controls	51.7	44.7	44.2	56.7	52.1	55.4
Firm pay controls	52.7	43.6	40.7	52.5	47.5	56.3
All combined	52.1	46.4	44.0	49.6	48.9	52.6
			c) Parents – difference from Raw			
Demog controls	-0.6	0.8	1.8	4.0	3.0	-0.9
Qualification controls	-0.2	0.8	2.1	-1.9	-1.3	-1.1
Urban area controls	0.1	1.1	-1.7	-2.3	-1.5	-0.1
Language controls	-0.5	1.3	1.0	0.8	0.4	-0.6
Firm pay controls	0.3	-0.6	-3.4	1.0	0.8	0.1
All combined	-0.7	2.4	0.7	1.4	0.9	-2.2
			d) Children – difference from Raw			
Demog controls	0.1	-0.5	-0.1	0.2	-0.8	-1.0
Qualification controls	-0.3	2.1	2.3	-4.1	-0.4	-1.7
Urban area controls	0.1	1.4	-1.7	-3.3	-1.9	0.0
Language controls	-0.3	2.3	0.0	-1.8	3.0	-1.1
Firm pay controls	0.7	1.1	-3.6	-6.1	-1.6	-0.3
All combined	0.1	3.9	-0.2	-8.9	-0.2	-4.0

Note: Measures are based on IV estimates of persistence, as shown in Table 10 and Table 16.

Table 16: Covariate-adjusted intergenerational (relative) persistence

Dependent var is	Child ethnicity is						
Child rank	All	European	Māori	Pacific	Asian	MELAA	Other
Raw	0.266***	0.242***	0.309***	0.248***	0.179***	0.293***	0.211***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.012)	(0.030)	(0.020)
Demog controls	0.256***	0.241***	0.284***	0.218***	0.169***	0.287***	0.207***
	(0.003)	(0.003)	(0.006)	(0.010)	(0.012)	(0.030)	(0.020)
Qualification controls	0.176***	0.164***	0.243***	0.187***	0.089***	0.175***	0.152***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.013)	(0.030)	(0.021)
Urban area controls	0.237***	0.208***	0.280***	0.238***	0.164***	0.272***	0.186***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.013)	(0.030)	(0.020)
Language controls	0.245***	0.228***	0.291***	0.244***	0.169***	0.260***	0.202***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.013)	(0.030)	(0.020)
Firm pay controls	0.194***	0.155***	0.231***	0.184***	0.121***	0.211***	0.141***
	(0.003)	(0.003)	(0.006)	(0.011)	(0.013)	(0.030)	(0.020)
All Combined	0.114***	0.104***	0.147***	0.108***	0.048***	0.106***	0.090***
	(0.003)	(0.003)	(0.006)	(0.010)	(0.012)	(0.029)	(0.021)
	Reduction in estimated persistence (relative to Raw)						
Demog controls	-0.01	0.00	-0.03	-0.03	-0.01	-0.01	0.00
Qualification controls	-0.09	-0.08	-0.07	-0.06	-0.09	-0.12	-0.06
Urban area controls	-0.03	-0.03	-0.03	-0.01	-0.02	-0.02	-0.03
Language controls	-0.02	-0.01	-0.02	0.00	-0.01	-0.03	-0.01
Firm pay controls	-0.07	-0.09	-0.08	-0.06	-0.06	-0.08	-0.07
All Combined	-0.15	-0.14	-0.16	-0.14	-0.13	-0.19	-0.12

Note: Each coefficient in this table is from a separate regression. The regression sample is defined by the ethnic group (column) and the covariates (X_C and X_P in equation (4)) as specified in the row heading.

Table 17: Raw and covariate-adjusted steady state ranks

	European	Māori	Pacific	Asian	MELAA	Other
	(a) Steady-state rank					
Raw	51.7	41.3	44.5	61.7	50.5	56.8
Demog controls	52.0	40.4	43.8	60.9	48.2	55.7
Qualification controls	51.5	44.2	46.8	55.6	49.6	54.9
Urban area controls	51.9	43.0	42.8	57.9	48.4	56.7
Language controls	51.4	44.1	44.2	59.1	54.2	55.5
Firm pay controls	52.6	43.4	40.8	53.5	47.8	56.4
All combined	52.1	46.2	44.1	49.9	49.2	52.5
	(b) Covariate-adjusted steady-state rank – difference from Raw					
Demog controls	0.3	-0.9	-0.7	-0.8	-2.3	-1.1
Qualification controls	-0.2	2.9	2.2	-6.0	-0.9	-1.9
Urban area controls	0.2	1.6	-1.7	-3.8	-2.1	-0.1
Language controls	-0.3	2.8	-0.3	-2.6	3.7	-1.3
Firm pay controls	0.9	2.0	-3.7	-8.2	-2.7	-0.4
All combined	0.4	4.9	-0.5	-11.8	-1.3	-4.3

Note: Measures are based on IV estimates of persistence, as shown in Table 10 and Table 16.

Figure 1: Model of intergenerational persistence

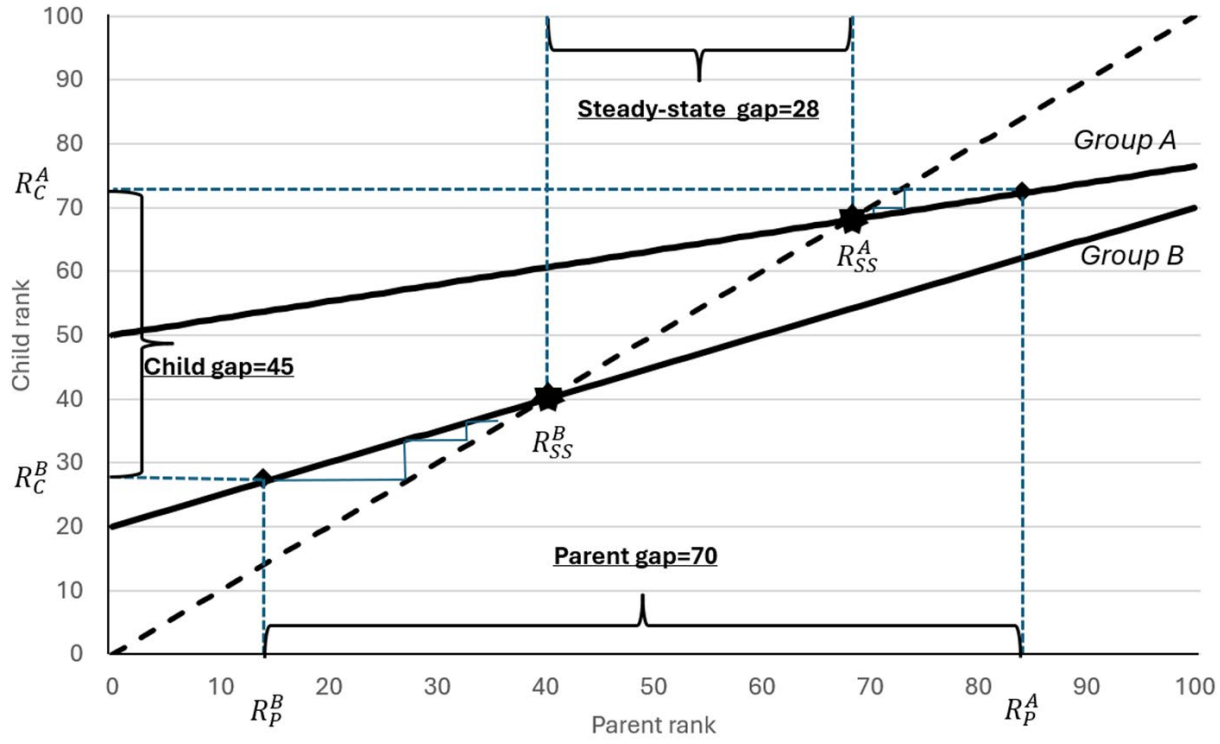


Figure 2: Earnings distributions of children and parents (Earnings Rate sample)

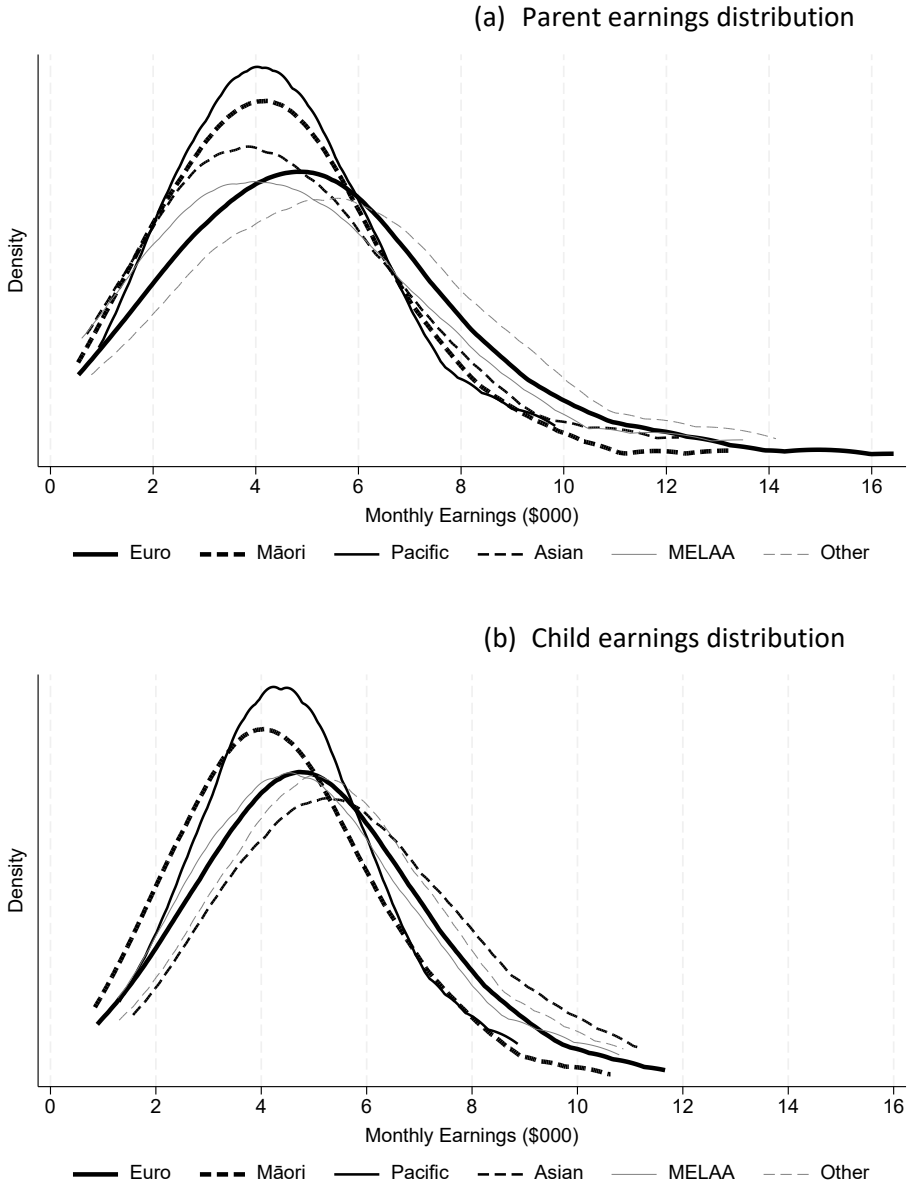
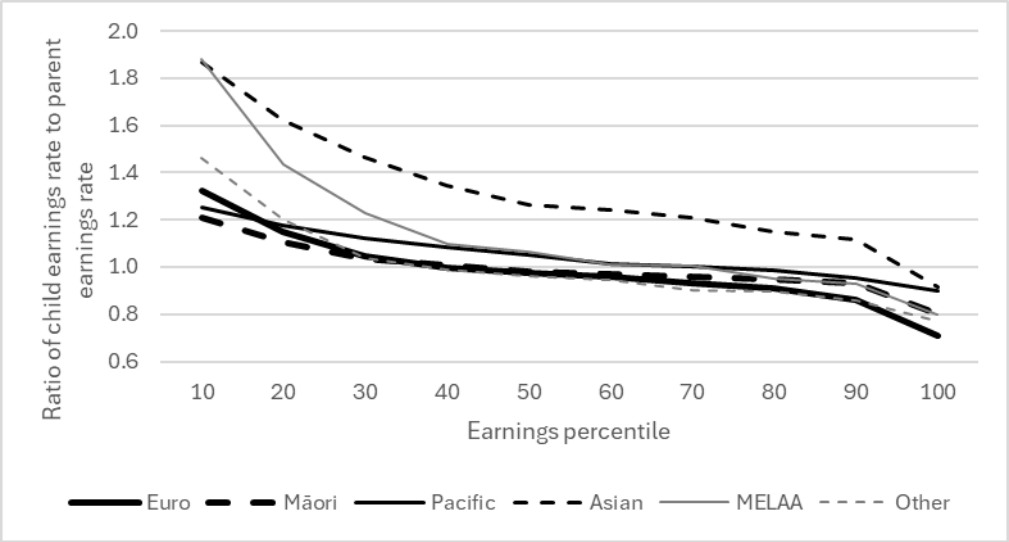
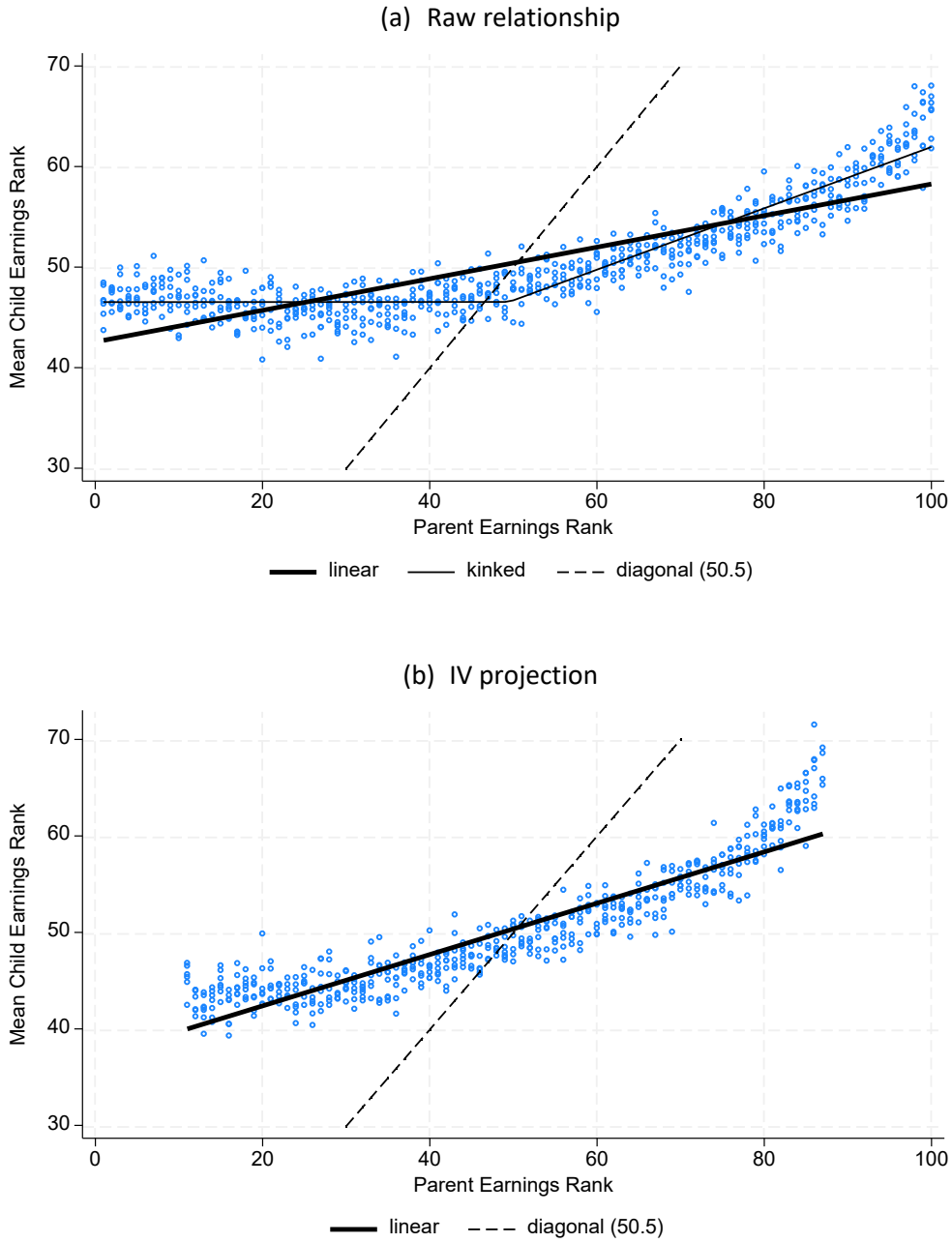


Figure 3: Ratio of child to parent earnings, (ethnicity-specific rankings)



Note: Ratios based on ratio of median earnings within rank

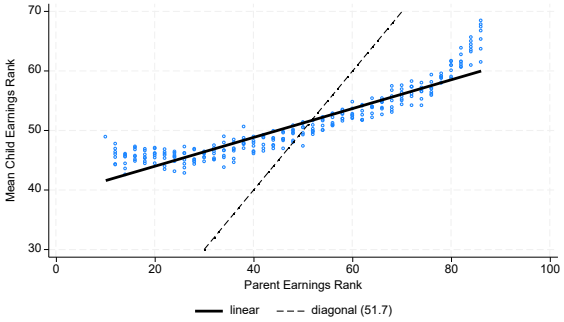
Figure 4: Plot of children's average earnings rate rank by parent's earnings rate rank



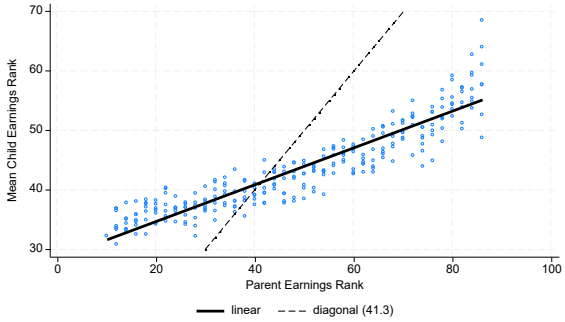
Note: Mean child earnings ranks are means within 1 percentile bins of parental rank. In the lower panel, parental earnings rank is defined as the rank of the fitted values from a regression of parental earnings rank on the rank of estimated worker fixed effects $\left(\hat{R}_p = a + b * R_{wfe}\right)$.

Figure 5: Ethnic group rank-rank plots (IV-projection)

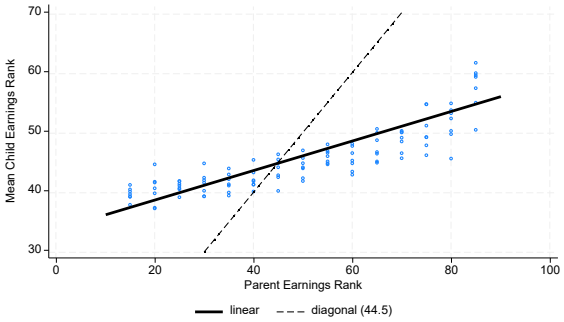
(a) European ethnicity



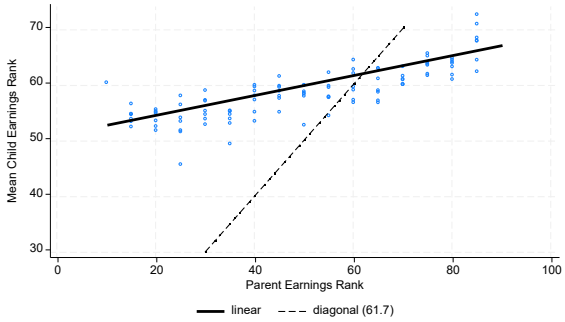
(b) Māori ethnicity



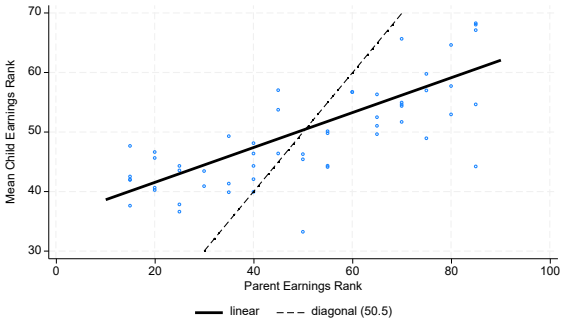
(c) Pacifica ethnicity



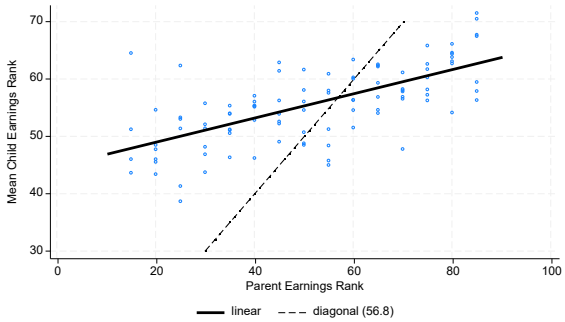
(d) Asian ethnicity



(e) MELAA ethnicity



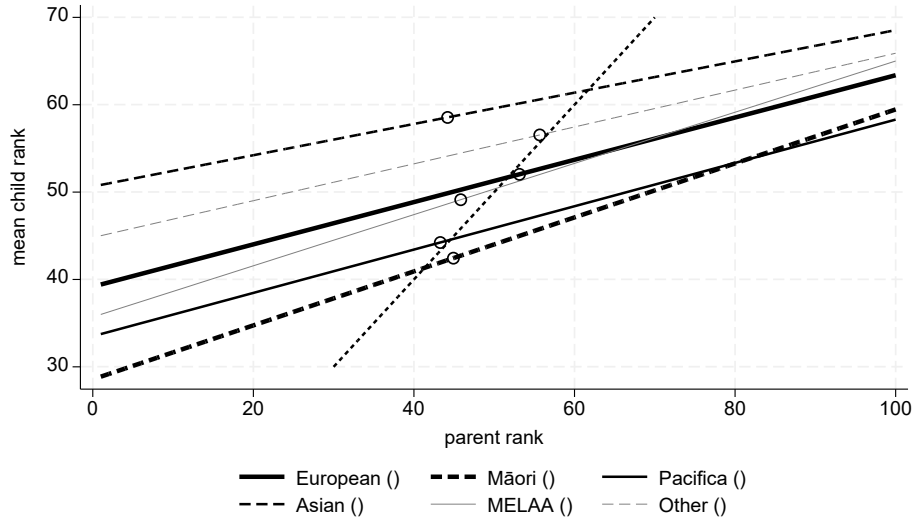
(f) Other ethnicities



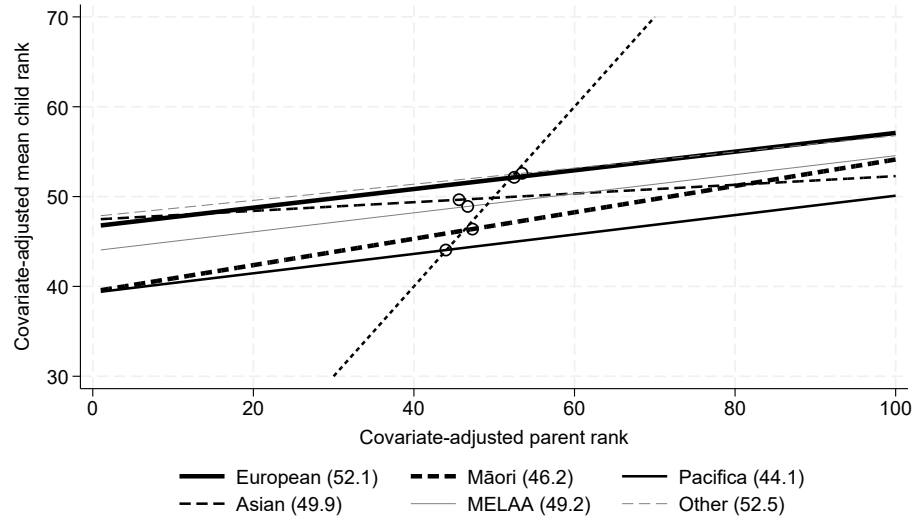
Note: Some data points are suppressed due to confidentialisation. Fitted lines are estimated using unconfidentialised data. Mean child earnings ranks are means within 1 percentile bins of parental rank. In the lower panel, parental earnings rank is defined as the rank of the fitted values from a regression of parental earnings rank on the rank of estimated worker fixed effects $\left(\hat{R}_p = a + b * R_{wfe}\right)$*. National (pooled ethnic groups) rankings.*

Figure 6: Raw and covariate-adjusted persistence

(a) Raw persistence



(b) Covariate-adjusted persistence



Note: Plotted lines are based on IV estimates. Circles indicate the mean parent and child ranks for each group. Numbers in brackets are steady-state ranks, which is where the group-specific line crosses the (short-dashed) diagonal line.

Figure 7: Current and steady state ranks

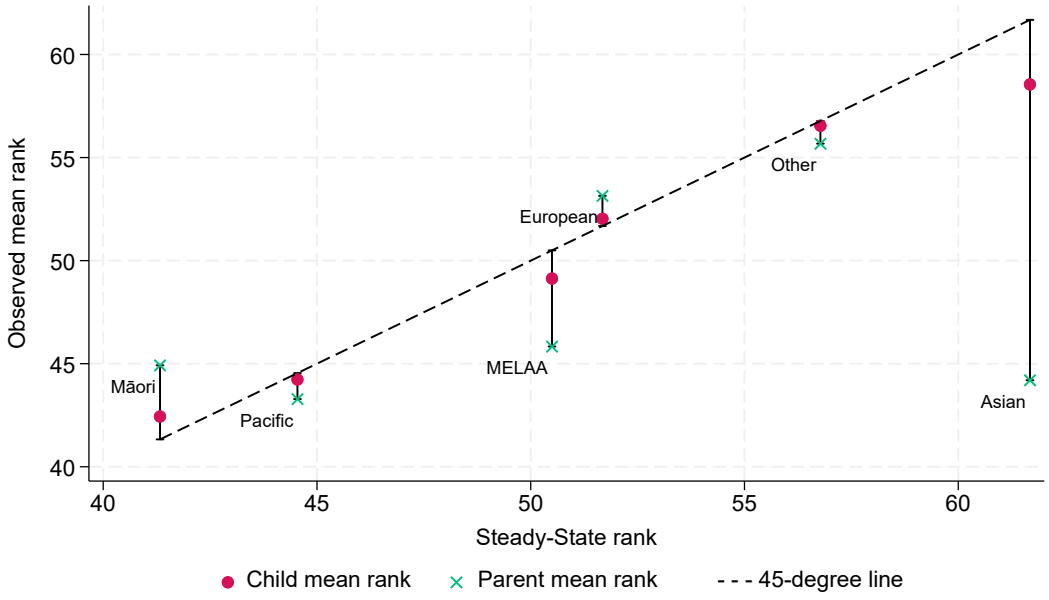
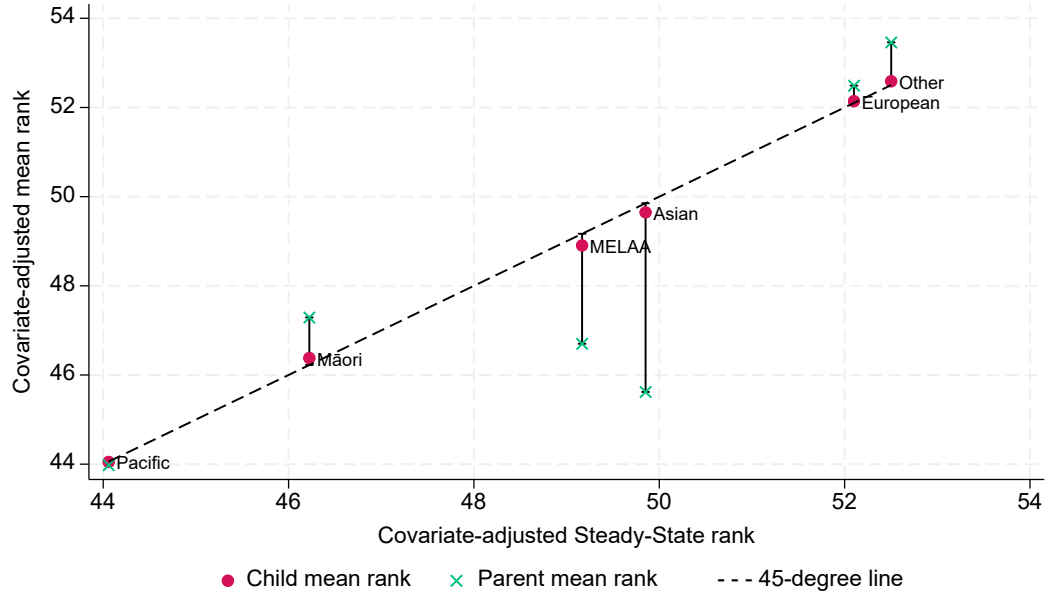


Figure 8: Covariate-adjusted steady state ranks



Appendix Tables and Figures

Table A1: Parent-child links: Data sources for Earnings Rate sample

Number of source links confirmed	Sources of link identification			
	Birth records	MSD	Other sources	Total
1	35.9%	8.2%	5.7%	49.8%
2	38.6%	0.0%	1.9%	40.5%
3+	9.4%	0.0%	0.2%	9.7%
Total	84.0%	8.2%	7.8%	100.0%

Table A2: Sample sizes by cohort (Centred at age 30)

By Cohort Breakdown for Centred at 30	Employment Sample		Earnings Rate sample	
	Child	Parents	Child	Parent
1986	37,182	27,702	24,315	24,075
1987	39,126	28,983	26,283	25,977
1988	40,662	28,893	27,660	27,378
1989	42,027	29,379	28,884	28,548
1990	43,452	31,686	30,303	29,982
1991	43,824	35,508	31,614	31,224
1992	41,772	35,220	29,043	28,758
Total	288,048	217,368	198,102	158,847

Table A3: Child-parent pairs: Sample sizes by ethnicity (Centred at age 30)

	Employment sample		Earnings Rate sample	
	Count	% of Pooled sample	Count	% of Pooled sample
European	219,369	76%	154,653	78%
Māori	80,304	28%	49,950	25%
Pacific	30,729	11%	20,841	11%
Asian	17,844	6%	12,651	6%
MELAA	3,897	1%	2,103	1%
Other	5,532	2%	4,152	2%

Table A4: Cohort sizes by ethnicity - Earnings Rate sample (Centred at age 30)

	European		Māori		Pacific		Asian		MELAA		Other	
cohort	Children	Parents	Children	Parents	Children	Parents	Children	Parents	Children	Parents	Children	Parents
1986	19,686	19,518	5,865	5,826	2,154	2,136	1,116	1,110	195	195	567	567
1987	20,955	20,739	6,666	6,600	2,484	2,454	1,365	1,362	252	252	558	555
1988	21,852	21,660	6,999	6,942	2,718	2,694	1,560	1,548	294	291	597	594
1989	22,311	22,083	7,437	7,365	3,129	3,096	1,884	1,863	312	309	654	654
1990	23,415	23,196	7,635	7,563	3,363	3,315	2,127	2,115	333	333	639	639
1991	24,264	23,994	7,950	7,857	3,633	3,582	2,346	2,319	378	378	612	612
1992	22,170	21,960	7,404	7,350	3,366	3,336	2,253	2,232	339	339	525	522
All	154,653	124,974	49,950	41,376	20,841	16,905	12,651	11,115	2,103	1,992	4,152	4,014

Note: all numbers randomly rounded. Ethnicity refers to the ethnicity of the child. Each child may be included in more than one ethnicity group, due to multiple responses.

Table A5: Income source persistence: Sample proportions

		Child ethnicity					
	All	European	Māori	Pacific	Asian	MELAA	Other
			Child				
WAS Only	59%	62%	45%	53%	70%	45%	70%
WAS + Soc. Assist.	14%	12%	22%	18%	8%	15%	9%
WAS + Other	3%	3%	3%	3%	3%	4%	3%
Non-WAS	14%	13%	22%	16%	8%	17%	10%
Missing	10%	10%	8%	9%	11%	19%	8%
			Parent				
WAS Only	69%	73%	57%	63%	69%	58%	77%
WAS + Soc. Assist.	18%	14%	29%	24%	14%	24%	11%
WAS + Other	5%	5%	4%	3%	3%	4%	5%
Non-WAS	5%	4%	7%	6%	5%	8%	3%
Missing	4%	4%	2%	3%	9%	5%	4%
Number of pairs	288,048	219,369	80,304	30,729	17,844	3,897	5,532

Note: Children who identify with more than one ethnicity contribute to more than one column. The total number of parent child-pairs is thus less than the sum of the number in each ethnic group.

Table A6: Persistence of employment intensity: Sample proportions

		Child ethnicity					
	All	European	Māori	Pacific	Asian	MELAA	Other
			Children				
Zero	14%	13%	22%	16%	8%	17%	10%
1-5Months	10%	9%	12%	11%	8%	12%	7%
6-12Months	67%	69%	58%	64%	73%	52%	75%
Missing	10%	10%	8%	9%	11%	19%	8%
			Parents				
Zero	5%	4%	7%	6%	5%	8%	4%
1-5Months	8%	7%	11%	10%	11%	14%	7%
6-12Months	83%	85%	80%	81%	75%	74%	86%
Missing	4%	4%	2%	3%	9%	5%	4%
Number of pairs	288,048	219,369	80,304	30,729	17,844	3,897	5,532

Note: Children who identify with more than one ethnicity contribute to more than one column. The total number of parent child-pairs is thus less than the sum of the number in each ethnic group.

Table A7: Linear rank-rank regression by ethnic group– variation by age of child]

			Child ethnicity is				
Dependent var is Child rank	All	European	Māori	Pacific	Asian	MELAA	Other
			(a) All available cohorts				
P rank (child aged 30)	0.266***	0.242***	0.309***	0.248***	0.179***	0.293***	0.211***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.012)	(0.030)	(0.020)
N	198,099	154,653	49,950	20,841	12,651	2,103	4,152
P rank (child aged 31)	0.265***	0.241***	0.305***	0.264***	0.187***	0.313***	0.223***
	(0.003)	(0.004)	(0.007)	(0.013)	(0.014)	(0.034)	(0.022)
N	159,429	125,193	39,747	16,446	9,798	1,629	3,462
P rank (child aged 32)	0.257***	0.235***	0.293***	0.267***	0.175***	0.298***	0.229***
	(0.004)	(0.004)	(0.009)	(0.016)	(0.016)	(0.042)	(0.024)
N	122,880	97,176	30,288	12,318	7,161	1,152	2,778
P rank (child aged 33)	0.251***	0.230***	0.287***	0.273***	0.176***	0.358***	0.226***
	(0.004)	(0.005)	(0.010)	(0.019)	(0.020)	(0.050)	(0.028)
N	91,332	72,864	22,188	8,871	4,965	801	2,109
P rank (child aged 34)	0.251***	0.232***	0.306***	0.269***	0.185***	0.343***	0.202***
	(0.005)	(0.006)	(0.012)	(0.023)	(0.024)	(0.064)	(0.033)
N	64,566	52,008	15,540	5,979	3,252	543	1,479
P rank (child aged 35)	0.244***	0.228***	0.301***	0.278***	0.180***	0.358***	0.264***
	(0.007)	(0.007)	(0.016)	(0.030)	(0.031)	(0.086)	(0.042)
N	40,659	32,991	9,732	3,660	1,935	306	948
			(b) Single Cohort (1987)				
P rank (child aged 30)	0.278***	0.245***	0.322***	0.271***	0.219***	0.315***	0.233***
	(0.009)	(0.009)	(0.019)	(0.036)	(0.038)	(0.088)	(0.054)
N	26,283	20,955	6,666	2,484	1,365	252	558
P rank (child aged 31)	0.275***	0.245***	0.308***	0.278***	0.212***	0.376***	0.258***
	(0.009)	(0.010)	(0.020)	(0.037)	(0.039)	(0.092)	(0.054)
N	24,774	19,788	6,240	2,340	1,281	225	540
P rank (child aged 32)	0.267***	0.242***	0.305***	0.294***	0.205***	0.361***	0.231***
	(0.009)	(0.010)	(0.020)	(0.038)	(0.040)	(0.095)	(0.056)
N	23,544	18,897	5,838	2,223	1,194	204	516
P rank (child aged 33)	0.263***	0.243***	0.313***	0.301***	0.198***	0.371***	0.209***
	(0.009)	(0.010)	(0.021)	(0.039)	(0.041)	(0.099)	(0.056)
N	22,515	18,153	5,496	2,103	1,131	192	495
P rank (child aged 34)	0.256***	0.239***	0.323***	0.284***	0.185***	0.307**	0.206***
	(0.009)	(0.010)	(0.021)	(0.040)	(0.042)	(0.102)	(0.058)
N	21,882	17,625	5,367	2,037	1,092	174	486
P rank (child aged 35)	0.252***	0.237***	0.321***	0.313***	0.166***	0.345***	0.210***
	(0.010)	(0.010)	(0.022)	(0.041)	(0.043)	(0.104)	(0.060)
N	20,853	16,824	5,082	1,929	1,053	162	456

*Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

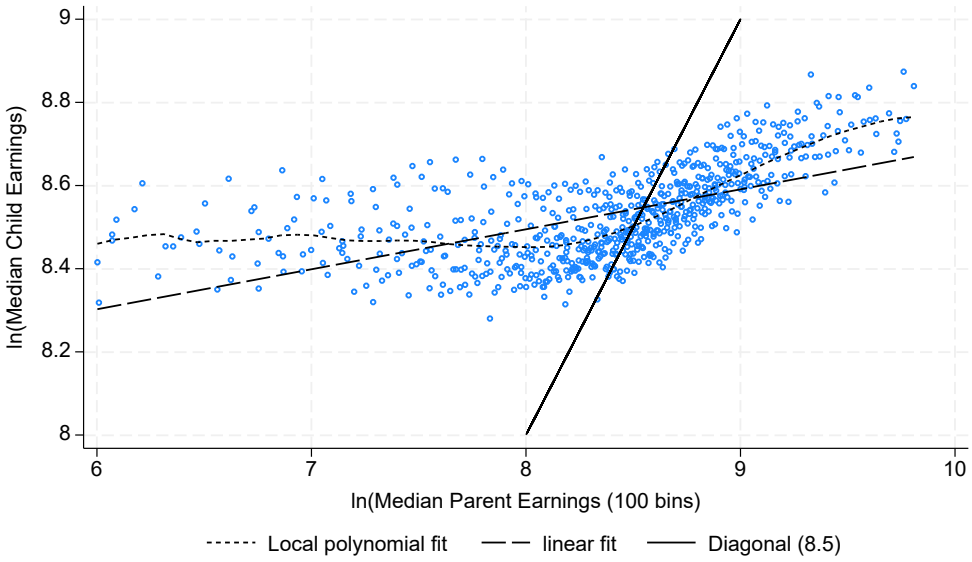
Table A8: Relative persistence using ethnic-group specific rankings

			Child ethnicity is				
Dependent var is Child rank	All	European	Māori	Pacific	Asian	MELAA	Other
Parental rank	0.266***	0.246***	0.291***	0.235***	0.187***	0.290***	0.216***
	(0.003)	(0.003)	(0.007)	(0.012)	(0.013)	(0.031)	(0.020)
Constant	37.05***	38.10***	35.80***	38.63***	41.03***	35.68***	39.51***
	(0.240)	(0.266)	(0.504)	(0.864)	(1.073)	(2.581)	(1.578)
Observations	198,099	154,653	49,950	20,841	12,651	2,103	4,152
Adj. R-squared	0.013	0.011	0.017	0.006	0.006	0.002	0.007

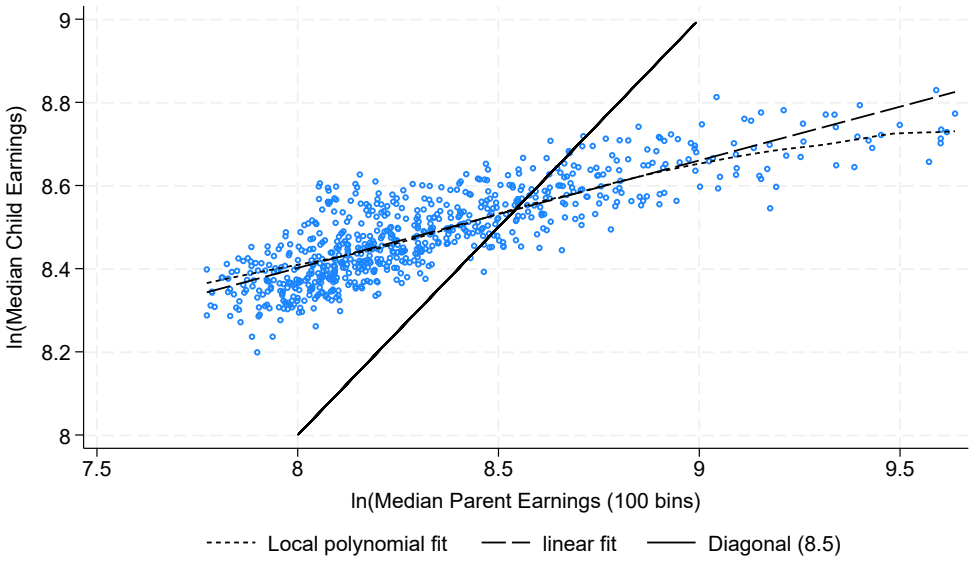
*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Evaluated for child age around 30, IV estimation*

Figure A1: Plot of child median log earnings by parent earnings

(a) Raw relationship



(b) IV projection



Note: ln(median child earnings)[27] is a mean within 1 percentile bins of ranked parent earnings. In the lower panel, parental earnings is defined as the fitted value from a regression of parental ln(earnings) on estimated worker fixed effects $\left(\widehat{ln\,E_p} = c + d * wfe_p\right)$.

[27]. ln(median earnings) = median(lnEarnings)