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Intergenerational Income Mobility in New Zealand

Abstract

Intergenerational mobility considers how a child's outcomes are associated with their parents' situation. If intergenerational mobility is low, then a child has less of a chance of moving up the income distribution relative to their parents. This can influence skills development, productivity growth and the achievement of improved living standards.

The findings presented in this article highlight the importance of policies that focus resources on improving educational outcomes for students from low socio-economic backgrounds, which would help lift intergenerational economic mobility and support higher living standards for all.

Keywords income mobility, educational outcomes, child wellbeing

Intergenerational income mobility refers to 'a child's chance of moving up in the income distribution relative to her parents' (Chetty et al., 2014a). The Treasury has previously explored this topic in a 2010 working paper (Gibbons, 2010), which made use of the Dunedin Study of people born in Dunedin in 1972–73. That paper described why intergenerational mobility matters:

> Researchers are interested in intergenerational economic mobility because of its implications for equality of opportunity and because barriers to people developing and making full use of their abilities could potentially hinder skills development, productivity growth and the achievement of improved living standards. (p.1)

Intergenerational mobility is relevant to the Treasury's Living Standards Framework and making the best use of New Zealand's human capital. It also affects the distribution of wellbeing if children from low-income households face significant obstacles to making the most of their potential.

The analysis in the Treasury's 2010 working paper was constrained by the sample of people in the Dunedin Study. This limited the number of cases and raised some questions about how well this sample represented New Zealand more broadly. The paper speculated:

> In the future, it might be possible to develop large national datasets containing the incomes of New Zealanders from government statistical records ... However, researchers using administrative data to study intergenerational mobility would need to match individual-level historical data on parents with subsequent data on their grown-up children. (p.38)

A decade later it is possible to use the Integrated Data Infrastructure (IDI) to explore intergenerational income mobility.[2] The IDI links various administrative and

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survey datasets to a central 'spine', which aims to include all people living in New Zealand. Using the IDI, it is possible to identify cohorts of children born in New Zealand and analyse how their income at age 30 is associated with their parents' income when they were growing up (aged 15–19).

It is also possible to look at qualification completion rates (for level 4+ and level 7+) at age 30, and level 7+ qualification enrolment rates by age 20. Qualifications are strongly related to lifetime earnings potential, so this gives us a secondary measure of intergenerational mobility.

Table 1: Sample sizes at each stage of selection for intergenerational income mobility analysis, at ages 30 and 26

Cohort selection stage	Born 1985/6 to 1987/8 (income at age 30)	Born 1985/6 to 1991/2 (income at age 26)
Births	163,800	403,600
Child on IDI spine	163,000	401,800
Parents on IDI spine	141,400	351,000
Child has recorded income in relevant tax year	96,500	255,800
Parents have recorded income when child aged 15 to 19	93,900	249,000

Source: author's calculations

Table 2: Sample sizes at each stage of cohort selection for intergenerational analysis of education outcomes

	People with level 4+ and level 7+ qualifications by age 30	Enrolment for a level 7+ qualification at age 20
	Born 1985/6 to 1987/8	Born 1985/6 to 1996/7
Births where child and parents were on IDI spine	141,400	611,100
Child had not permanently departed NZ	130,400	590,900
Parents had recorded income when child aged 15 to 19	123,300	551,900

Source: author's calculations

Methodology

Measuring income mobility

This analysis used two indicators of the income mobility of children:

- income rank at age 30 compared to other cohort members born in the same tax year; and
- the probability of being in the top income quintile at age 26 (time series by year of birth).

This article uses a cohort of people born in the three tax years from 1985/6 to 1987/8 for the indicators relating to age 30, and a cohort born between 1985/6 and 1991/2 for the indicators at age 26.

Children were linked to parents using the Department of Internal Affairs' (DIA) births data. Then, data from Inland Revenue and the Ministry of Education were used to track outcomes for the children and their parents. This analysis only used records where children and both parents can be linked to the IDI spine, where the child has recorded income in the relevant tax year, and where parents have recorded income when the children were aged 15–19. This means that each record was matched to data on income and qualifications.

Table 1 shows the sample sizes at each stage of the cohort selection process. For the main analysis at age 30, the final cohort was 57% of the recorded births between 1985/6 and 1987/8. Almost all of the recorded births were found on the IDI spine. There were significant drops in the cohort size due to some parents not being found on the IDI spine (14% of the cohort) and the child not having any recorded income in their 30th year (27% of the cohort). A further 2% of the cohort was removed due to no parental income being found in the years when the child was aged 15–19.

The majority of the people with no recorded income in their 30th year were out of the country for at least some of that year. Migration data showed that 70% of these people were out of the country for a period of at least 90 days on their 30th birthday. Of the people who had no recorded income in their 30th tax year but were not overseas for an extended period of time, 55% were female. This group was distributed evenly across the different levels of parent income.

The large majority (94%) of the cohort had two recorded parents in the births data, with the remainder having just one. The results for intergenerational mobility were very similar when the cohort was limited to only those people with two recorded parents, so the 6% of the cohort who had only one recorded parent was included.

Measuring education outcomes

This analysis used two indicators of educational performance:

- having a level 7+ or level 4+ qualification by age 30; and
- being enrolled for a level 7+ qualification by age 20.

The Ministry of Education's tertiary completions and industry training datasets were used for qualification rates for level 7+ and level 4+ at age 30. Accurate data on school qualifications (levels 1–3), including alternative qualification frameworks, was not available for the relevant time period.

The Ministry of Education's tertiary enrolments dataset was used to calculate the percentage of people who had enrolled on a course associated with a level 7+ qualification by age 20 (before turning 21). In this case, we used a cohort of people born between 1985/6 and 1996/7. This gave us a significantly longer period of time over which we could observe this cohort compared with the cohort for completed qualifications by age 30.

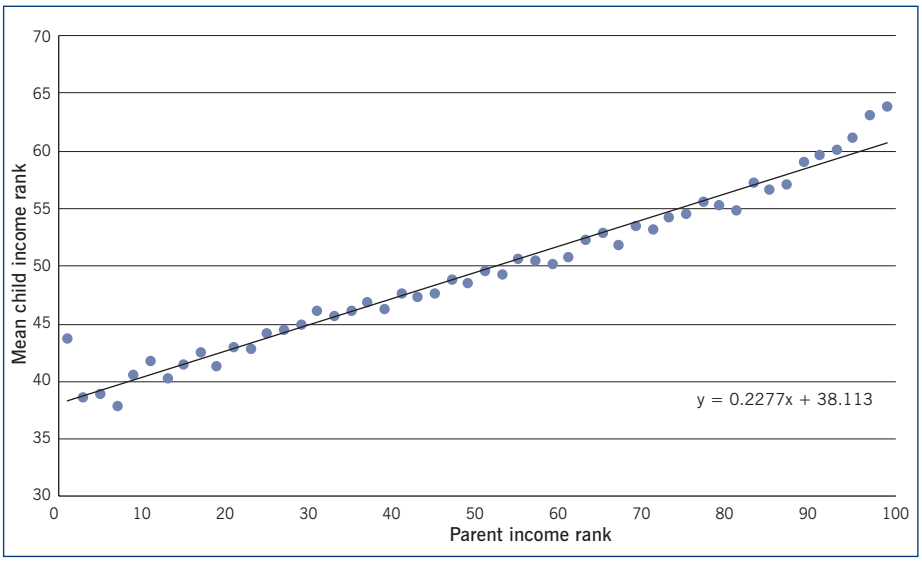
Table 2 shows the sample size at each stage of the cohort selection process. To set up the cohorts, we again started with recorded births between 1985/6 and 1987/8 where the child and parents were all found on the IDI spine. Then we used the IDI migration data to remove anyone who had left New Zealand at the age we were interested in (30 or 20) and not returned. This step wasn't necessary for the income analysis because anyone who didn't have a recorded income in the relevant year was excluded. Finally, we removed any of the cohort where the parents had no recorded income during the years when their child was aged 15–19.

Results for intergenerational income mobility

Income rank at age 30

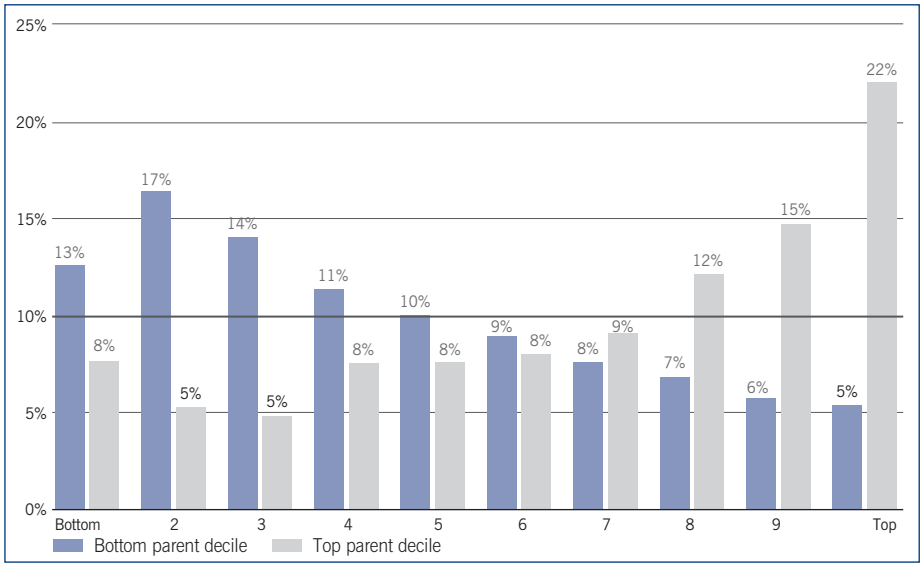
This analysis measured intergenerational mobility using a rank–rank specification:

Figure 1: Child income rank at age 30 versus parent income rank, for children born between 1985/6 and 1987/8



Source: author's calculations

Figure 2: Income rank by decile at age 30, for children of parents in the top and bottom income deciles (1985/6 to 1987/8 birth cohort)



Source: author's calculations

that is, it compared a parent's rank in the earnings distribution and their children's rank in earnings distribution as adults. We adopted Raj Chetty's approach (Chetty et al., 2014a, 2014b) and aimed to replicate his results in the New Zealand context. He found that 'rank–rank specifications provide a more robust summary of intergenerational mobility than traditional log–log specifications'.

For each person in the cohort (born between 1985/6 and 1987/8), their income at age 30 was compared with that of other members of the cohort who were born in the same year. Their parents' income was also ranked and compared with the parents of other cohort members born in the same year. Parental income was defined as their combined average annual income during the tax years that included their child's 15th–19th birthdays. Then, the analysis compared the relationship between the child and parent income ranks.

Figure 1 plots the average income rank of children in their 30th year versus parent income rank. The top percentile rank (100) represents the highest parent incomes, while the bottom percentile rank (1) represents the lowest parent incomes. To reduce noise, we divided parent income ranks into 50 (rather than 100) percentile bins.

This analysis suggests a clear relationship: the rank–rank slope is almost perfectly linear. We can interpret the slope of this line (0.23) as the difference in the expected income rank between children of the highest income and lowest income parents: that is, a 10 percentile increase in parent income rank is associated with a 2.3 percentile increase in their child's expected income rank. This result is lower than Chetty's result for the United States of around 0.3 (Chetty et al., 2014a) and appears to indicate that New Zealand has more intergenerational mobility than the United States.[3] This finding is consistent with other cross-country research (Corak, 2013).

However, the results contain information beyond this trend. There is a small peak, above the linear line of best fit, for the children of parents above the 95th income percentile. This indicates that these children have particularly good prospects for their income at age 30. There is also a slightly higher child income rank associated with parents at the very bottom of the distribution. This may indicate that some of these parents are not genuinely very low income (e.g., they had income that does not appear in the Inland Revenue dataset) or were wealthy despite having low recorded income.

The children of the lowest income parents were, on average, slightly below the 40th percentile for income at age 30. The children of the highest income parents were, on average, slightly above the 60th percentile for income at age 30.

To provide some context for this result, the children of bottom-decile parents had an average income of $36,900 at age 30, while the children of top-decile parents had an average income of $61,700.[4] This means that, on average, the child of a parent in the top income decile earns $24,800 more at age 30 than the child of a parent in the bottom income decile.

Figure 2 summarises the income distribution for the cohort at age 30, comparing the children of parents in the lowest income decile with the children of parents in the highest income decile. If the incomes between generations were entirely independent of one another, then we would expect all of these values to be around 10% (highlighted in the figure), with the children of top- and bottom-decile parents being evenly spread across the income distribution at age 30.

In fact, the children of top-decile parents were over-represented in the top three income deciles and under-represented

in the bottom three income deciles. The opposite was true for children of bottom-decile parents, who were over-represented in the bottom three deciles and under-represented in the top three deciles. Nearly half (49%) of the children of top-decile parents were in the top three income deciles at age 30, compared with only 18% of the children of bottom-decile parents. The children of top-decile parents were over four times more likely to be in the top income decile at age 30, compared with children of bottom-decile parents (22% vs 5%). Fewer than one in five children (18%) of top-decile parents were in the bottom three income deciles at age 30, compared with 43% of the children of bottom-decile parents.

These distributions for the children of top and bottom-decile parents are more similar to Canada than the US (Corak, 2013, figures 2 and 3). The US has 'more stickiness', with a higher proportion (about half) of children of bottom-decile parents rising no further than the bottom three deciles and a lower proportion (about 12%) rising to the top three deciles. However, differences in methodologies mean these comparisons are only provisional.

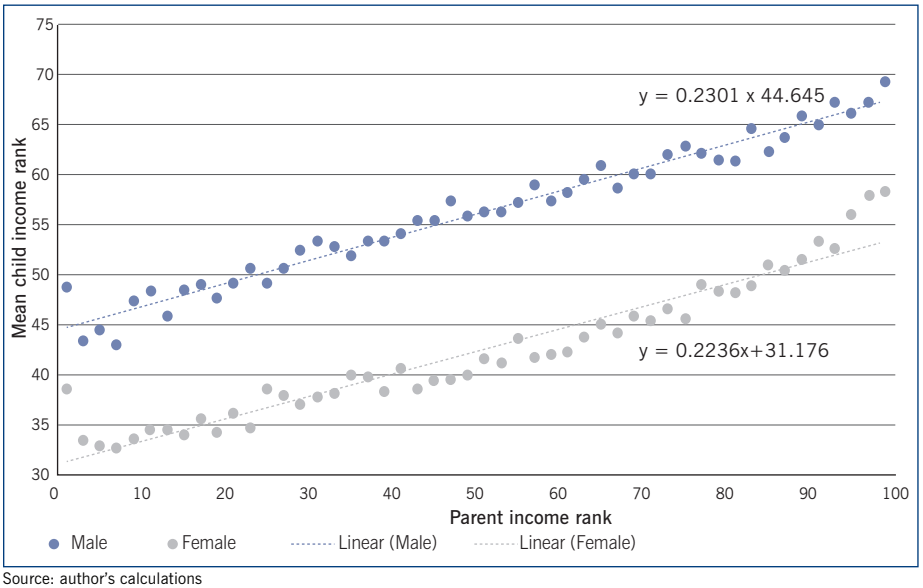
Figure 2 provides a reminder that, despite the clear relationship between parental income and average children's income at age 30, there is a lot of variation in individual outcomes. Parental income is not, by itself, a strong predictor of an individual child's income. A regression model of child income rank, with parent income rank as the only explanatory variable, explained 5.2% of the variation.

Income rank by gender

This section provides breakdowns by gender for intergenerational mobility. This analysis used the same cohort (children born between 1985/6 and 1987/8) and income ranks from the previous section. We did not produce a new set of income ranks within each demographic group, to allow for comparisons of outcomes across groups.

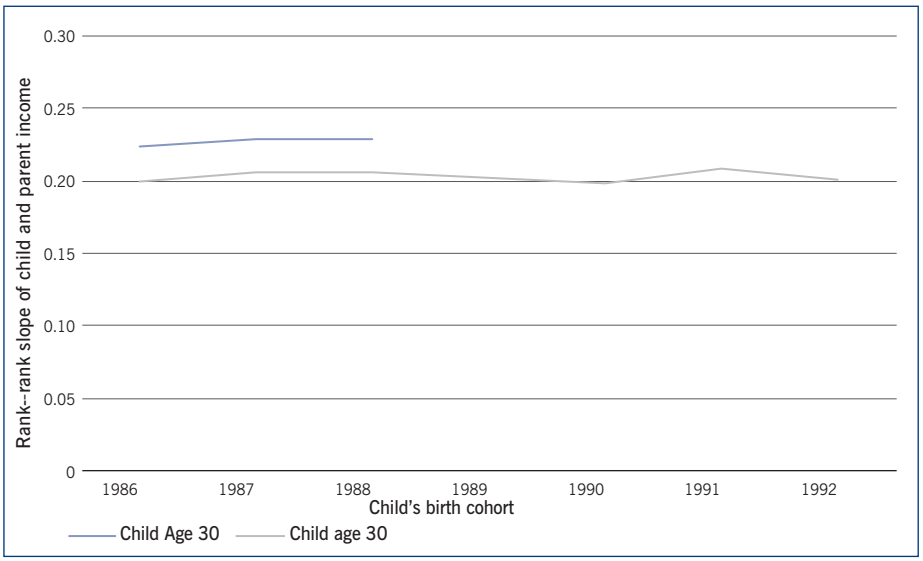
Figure 3 shows income rank at age 30 by sex, which indicates that intergenerational mobility is very similar for males and females. For both males and females, there is a linear rank–rank slope for income at age 30 and parent income.

Figure 3: Child income rank at age 30 versus parent income rank, for children born between 1985/6 and 1987/8, by sex



Source: author's calculations

Figure 4: Intergenerational mobility estimates for the birth cohorts from 1985/6 to 1991/2



Source: author's calculations

The gradients of the two slopes are very similar, and the difference is not statistically significant.

However, male children consistently have a higher average income rank at age 30 than female children. This difference was about 13.5 percentile points across the distribution of parental incomes. This meant, for example, that females with parents at the 90th income percentile had a similar average income rank to males with parents at the 30th income percentile. This may be partially explained by a higher proportion of males working full-time at age 30.

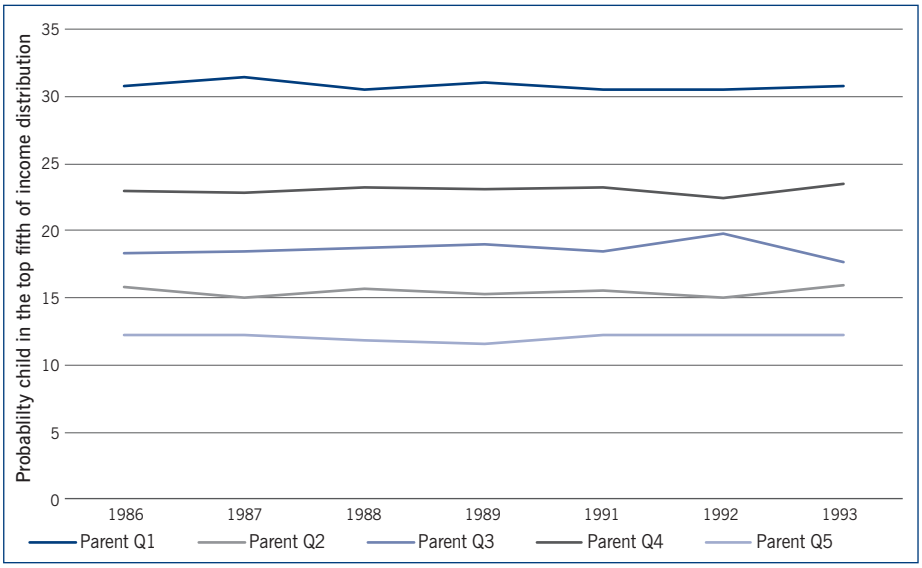
Female children of the highest income parents were particularly likely to earn a higher income at age 30 than other female children, as they were slightly above the linear slope for income rank. However, they still only had a similar average income rank to males with parents around the 60th income percentile.

Trends in income mobility

This section looks at trends in intergenerational mobility. Unfortunately, we can only produce a short time series for income mobility at age 30. A slightly longer time series is available for income at age 26, but this is a less reliable indicator than income at age 30.

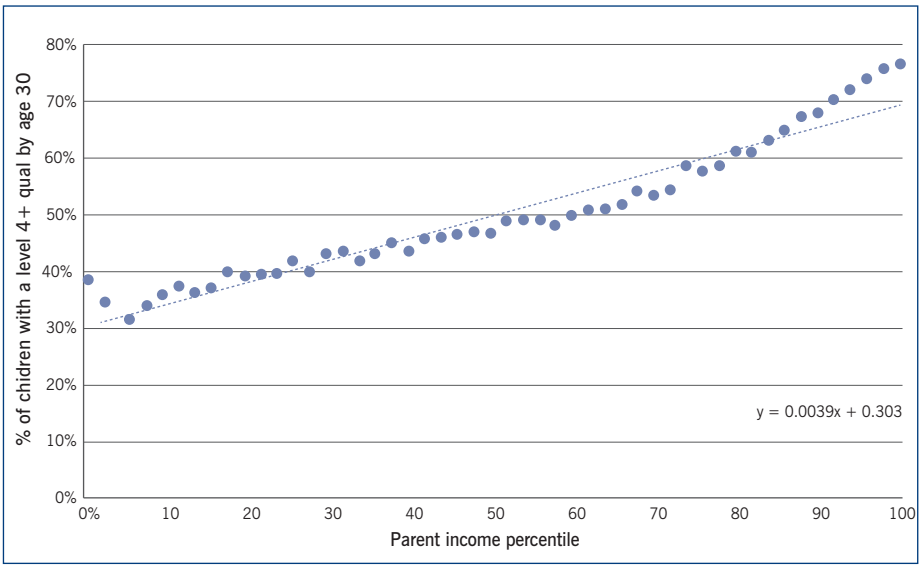
Figure 4 shows the estimates of intergenerational mobility by individual year of birth. Each estimate is based on a linear regression of child rank against parent rank for the relevant year of birth.

Figure 5: Probability of reaching top income quintile at age 26, by parent income quintile



Source: author's calculations

Figure 6: Rates of having a level 4+ qualification by age 30 versus parent income rank, for children born between 1985/6 and 1987/8



Source: author's calculations

These results indicate that parents' income is more strongly associated with children's income at age 30 than at age 26. The blue line shows the regression estimates for intergenerational mobility at age 30, which are consistently around 0.23. The orange line shows the estimates at age 26, which are consistently around 0.20. This difference is not surprising, because income at age 30 is generally a better early indicator of a person's longer-term income trajectory than income at age 26 (when they may still be doing casual part-time work).[5]

Levels of intergenerational mobility were quite stable for the cohorts born between 1985/6 and 1991/2, as indicated by the flat trends in Figure 4. In the future we will be able to look at a longer time period, as more tax data becomes available and perhaps the Department of Internal Affairs births data for recorded parents can be linked to the IDI spine for earlier years (prior to 1985).

Figure 5 shows, for each parent income quintile, the probability of their children being in the top income quintile at age 26. For 1985/6, 12% of the children of bottom-quintile parents were in the top income quintile at age 26. By comparison, 31% of the children of top-quintile parents were in the top income quintile at age 26. These results were quite stable for births between 1985/6 and 1991/2.

Compared with Chetty's results for the US (Chetty et al., 2014a), the children of bottom-quintile parents do slightly better in New Zealand. We found that 12% of these children made it to the top quintile at age 26, while Chetty's result was 9%.

Results for qualification levels

Qualification levels by age 30

As a second measure of intergenerational mobility, we have analysed qualification levels at age 30. Higher qualifications are associated with more skilled jobs and higher earnings.

The results show that parent income rank is clearly associated with their children's level 4+ and level 7+ qualification rates by age 30, but the strongest relationship is with level 7+ qualification rates.

Figure 6 shows the percentage of people with a level 4+ qualification at age 30 by the income rank of their parents. The figure shows the linear line of best fit, but the relationship between level 4+ qualification rates and parent income rank is not as linear as the relationships we saw between child and parent income ranks. The relationship is quite linear up till around the 70th percentile of parent income, and then level 4+ qualification rates for the children begin to increase more rapidly. The level 4+ qualification rates are under 35% for the lowest parent income percentiles, and rise to around 75% for the highest parent income percentiles.

Figure 7 shows the level 7+ qualification rates at age 30 by parent income rank. This relationship is clearly not linear. The level 7+ qualification rates increase at an exponential rate above the 70th percentile of parent income. Nearly two in three children (64%) with the highest income parents had a level 7+ qualification by age 30. This is well above the level 7+ qualification rate associated with parents at the 90th income percentile (50%). The level 7+ qualification rate falls to just over 10% for the children of parents with the lowest incomes. Children of top-decile parents were more than three times as likely to have a level 7+ qualification compared with children of bottom-decile parents (56% vs 18%).

Rates of having a level 7+ qualification by gender

In this section, we look at the rates for having a level 7+ qualification at age 30

by parent income and child gender. Figure 8 shows that females consistently have higher level 7+ qualification rates than males at age 30. The gap between males and females is relatively narrow till around the 40th percentile of parent income, and then broadens for higher parental incomes. The gap is around 8 percentage points for children of the lowest income parents, but is up to around 20 percentage points for children of parents in the top income quartile.

Trends in enrolment for level 7+ qualifications by age 20

To get a time series for qualification levels, we have looked at the enrolment rates for level 7+ qualifications by age 20 (before turning 21). Not everyone who enrols for a qualification will complete it, but this indicator gives us some insight into changes in qualification rates over time.

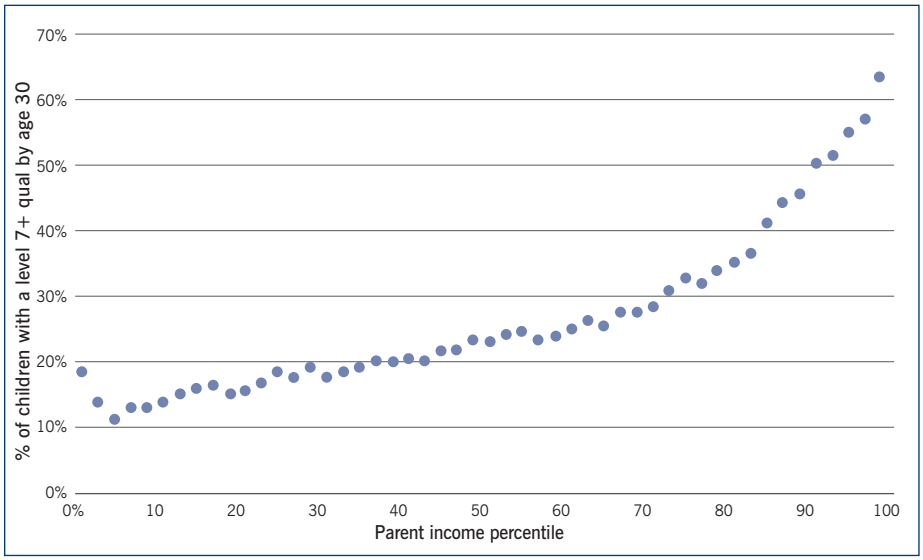
Figure 9 shows, by parent income quintile, the percentage of children who had enrolled for a level 7+ qualification by age 20. The results are shown by year of birth from 1985/6 to 1996/7.

There has been growth over time in the level 7+ qualification enrolment rates for children of each parent income quintile. In absolute terms, the highest growth in enrolment rates has been for the top two parent income quintiles (13 percentage points for the top quintile; 10 percentage points for the second top quintile), while the lowest growth has been for the bottom two parent income quintiles (4 percentage points for the bottom quintile; 5 percentage points for second-bottom quintile).

The relative percentage increases in the enrolment rates for each parent income quintile are quite similar. The biggest relative increase in enrolment rates was for the second and third parent income quintiles (up by 32%), while the other quintiles were all up by around 25%.

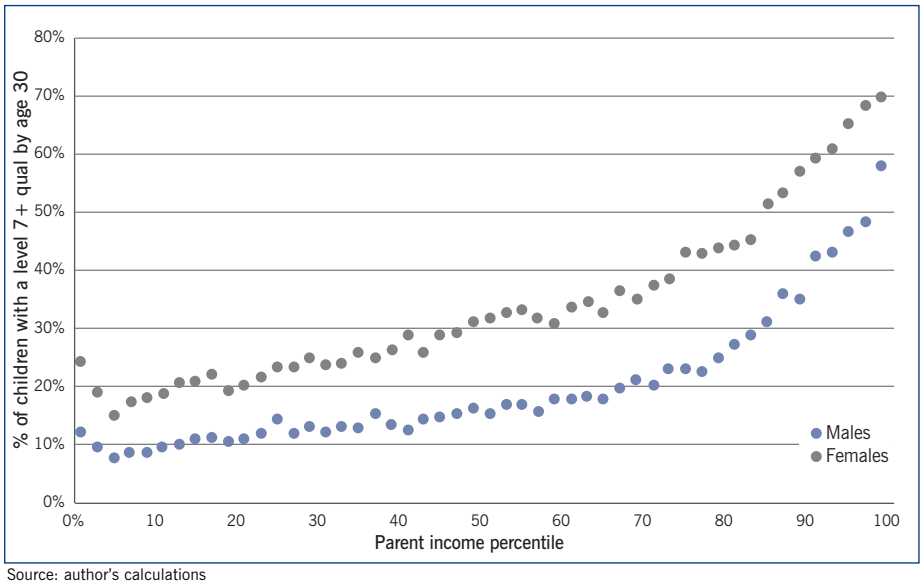
The level 7+ qualification enrolment rates, by age 20, have consistently been over three times higher for children of parents in the top income quintile compared with children of parents in the bottom income quintile. For children born in 1996/7, the level 7+ qualification enrolment rate by age 20 was 64% for children of top-quintile parents and 20% for children of bottom-quintile parents.

Figure 7: Rates of having a level 7+ qualification by age 30 versus parent income rank, for children born between 1985/6 and 1987/8



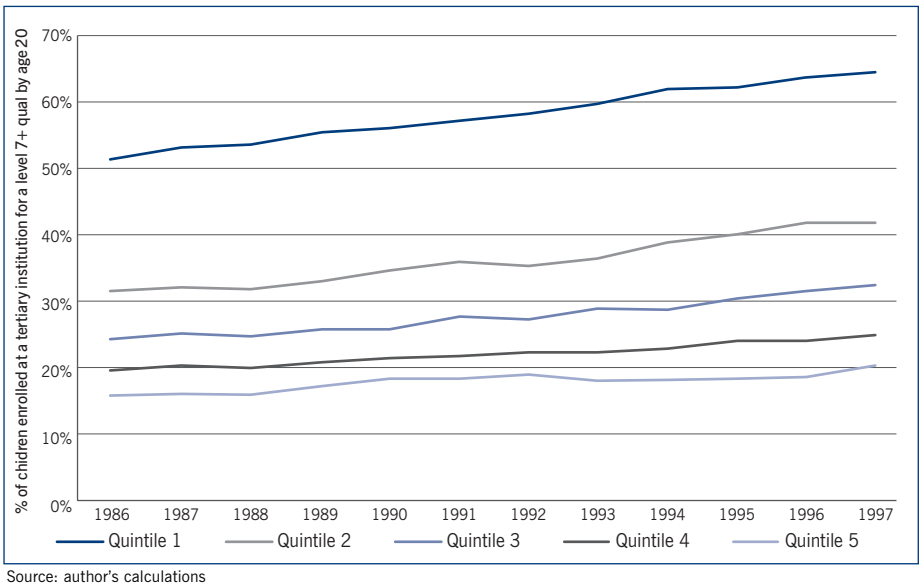
Source: author's calculations

Figure 8: Rates of having a level 7+ qualification by age 30 versus parent income rank by sex, for children born between 1985/6 and 1987/8



Source: author's calculations

Figure 9: Rates of enrolment for a level 7+ qualification by age 20, by parent income quintile and year of birth



Source: author's calculations

Conclusion

This article has used the linked population data in the IDI to provide new insights on intergenerational income mobility in New Zealand.

Income mobility

We replicated Chetty's finding from the US that there is a linear relationship between parent income ranks and the expected income rank of their children at age 30. Roughly, a 10 percentile increase in parent income rank is associated with a 2.3 percentile increase in their child's expected income rank. Nearly half (49%) of the children of top-decile parents were themselves in the top three income deciles at age 30, compared with only 18% of the children of bottom-decile parents.

Males and females had similar levels of income mobility. However, at each level of parent income the expected rank for males was about 13 points higher than for females.

We have relatively little data on trends over time for income mobility, but the patterns looked very stable for children born between 1985/6 and 1991/2.

Qualification rates and parent incomes

As a second measure of intergenerational mobility, we looked at qualification levels at age 30. Higher qualifications are associated with more skilled jobs and higher earnings.

A report by the New South Wales government found that

> the Australian education system plays a substantial (though not the only) part in the transmission of economic advantage … Education can not only contribute to the nation's economic growth and productivity, but it also has a role to play in how fair Australia will be.

It comments that resources need to be focused on improving outcomes for students from low socio-economic status backgrounds to increase opportunities regardless of background (Centre for Education Statistics and Evaluation, 2016).

Rates of having a level 4+ and level 7+ qualification by age 30 were positively associated with parent income. Qualification rates increased exponentially for higher parent income ranks, above the 70th percentile, particularly for level 7+ qualifications. Children of top-decile parents were more than three times as likely to have a level 7+ qualification compared with children of bottom-decile parents (56% vs 18%).

Females consistently had higher level 7+ qualification rates than males. The gap was around 8 percentage points for children of the lowest income parents and increased to around 20 percentage points for children of the highest income parents.

To analyse the trend over time, we looked at enrolment rates by age 20 for a level 7+ qualification. Then we looked at children born between 1985/6 and 1996/7. For children of parents in each income quintile, there had been growth in the enrolment rates over this period, but the largest increases (in absolute terms) were for the higher parent income quintiles. The enrolment rates have consistently been over three times higher for children of top-quintile parents compared with children of bottom-quintile parents.

These results highlight the importance of policies that focus resources on improving educational outcomes for students from low socio-economic backgrounds. This would, in turn, increase intergenerational economic mobility, which is key to making the best use of New Zealand's human capital and increasing living standards for all.

1 The views, opinions, findings and conclusions or recommendations expressed in this article are strictly those of the author. They do not necessarily reflect the views of the Ministry of Health or the New Zealand government. The Ministry of Health and the New Zealand government take no responsibility for any errors or omissions in, or for the correctness of, the information contained in this article. The article is presented not as policy, but with a view to inform and stimulate wider debate.

2 These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), which is carefully managed by Statistics New Zealand. 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 Statistics New Zealand 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.

3 We cannot replicate Chetty's method exactly, and cross-country comparisons are rarely precise, but the difference in the results is quite significant.

4 These income figures have been adjusted using the CPI to March 2018.

5 For each series, the small changes from year to year were not statistically significant.

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