

# Modelling costs v benefits of apprenticeship v degree

## A lifetime net financial position approach

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MAKING SENSE OF  
THE NUMBERS

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## 1 Disclaimer

**Note: This is a standard disclaimer required of all projects using Integrated Data Infrastructure data.**

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Statistics NZ.

The results in this report are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand.

The opinions, findings, recommendations, and conclusions expressed in this report are those of the authors, not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this [report, paper] have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from [www.stats.govt.nz](http://www.stats.govt.nz).

The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes.

In addition we have processed the confidentialised data obtained from the IDI by combining it with data from:

- StatsNZ Household Economic Survey -  
[http://www.stats.govt.nz/browse\\_for\\_stats/people\\_and\\_communities/Households/household-economic-survey.aspx](http://www.stats.govt.nz/browse_for_stats/people_and_communities/Households/household-economic-survey.aspx)
- Morningstar Kiwisaver survey Jun 2017 -  
[http://www.morningstar.com.au/s/documents/KiwiSaver\\_Survey\\_Q2\\_2017.pdf](http://www.morningstar.com.au/s/documents/KiwiSaver_Survey_Q2_2017.pdf)
- Publicly posted interest rates offered by banks
- MoE Student Loan Scheme Annual Report 2016 data -  
<https://www.educationcounts.govt.nz/publications/80898/student-loan-scheme-annual-report-2016>

Any person who has had access to the unit record data has certified that they have been shown, have read, and have understood section 81 of the Tax Administration Act 1994, which relates to secrecy. 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.

## 2 Introduction

BERL was tasked by the Industry Training Federation (ITF) to model the financial outcomes of people choosing between obtaining a degree or seeking an apprenticeship. This was motivated as a response to studies done by others based on Census data that look at broad averages without controlling for any other effects. And often conclude that the “best” career path is a degree. Based on not much more than the average income of degree holders, compared to all others.

We elect to focus on a net financial position over a person’s lifetime rather than focus solely on income. To show that the difference in the flow and growth of income for degree holders and apprentices are important and that the decision should not be based entirely on the average total earnings.

In this report we briefly document our methodology, sources of data, assumptions, main results, sensitivity analysis, and scenarios.

## 3 Methodology

We start by assuming three broad career paths that someone with sufficient aptitude could (i.e. achieved at least a level 2 secondary school qualification) take:

- Go to university and obtain a degree
- Approach an employer and become an apprentice (using level 4,5 and 6 qualification as a proxy)
- Seek employment without further education or training

By sufficient aptitude we refer to people who have a high enough level of innate skill to go to university and obtain a degree. We note that in such a study we need to do our best to control for the innate skill of our study population. To do so, we choose to study only those people who have obtained at least level 2 or equivalent secondary school qualification.

We model the net financial position of 3 “average” students over the course of their working lives (18 – 64). This boils down to calculating, for each year, their total assets and their total liabilities.

To do this we employ a combination of accounting models to enumerate flows of income and expenses between years and arrive at total assets and total liabilities at the end of each year.

Total assets are calculated by assuming the person enrolls in Kiwisaver and buys a house when they can afford the deposit, and also has some cash savings.

Total liabilities include any student loans and overdrafts the person incurs, as well as a mortgage which is amortized over a set period.

### 3.1 Sources of data

#### Integrated Data Infrastructure

The income data of the people we modelled is drawn from tax records obtained through the Statistics New Zealand Integrated Data Infrastructure. This database is an amalgamation of administrative data from across government departments. The data is stored at a unit-record level which allowed us to create a custom dataset of people who had obtained at least a level 2 or equivalent qualification at secondary school.

This allowed us to “control” for innate ability.

The income data we obtained is an aggregation of “employment-like” income:

- Wages and salary
- Director fees
- Sole proprietor salary
- Partner withholding payments

#### Other data

- Ministry of Education Student Loan Scheme report 2016
- Income tax as at September 2017 from the Income Tax Act
- Household Economic Survey
- Studylink student allowance entitlements as at September 2017

- Morningstar Kiwisaver survey
- Average overdraft rates calculated from posted rates by retail banks
- RBNZ Loan To Value Ratio policy
- Median house price data from REINZ
- Current Kiwisaver policy settings
  - Homestart grant
  - Withdrawal for first home rules
  - Employer contributions
  - Tax credit

### 3.2 Assumptions

We stress that we have taken a very conservative view of people in our study, our assumptions reflect this. These assumptions are built into the “base case” scenario and most can be changed to suit different scenarios readily. We offer a selection of explicitly modelled scenarios later in this report.

Our assumptions are:

- Secondary school qualification is a good proxy for innate ability

#### **Student (degree holder) specific assumptions:**

Adjustable:

- People take out an “average” size student loan (\$9,800 per year of study)
- People earn minimum wage (15.75) for 10 hours a week while studying for a degree
- Receive full amount of student allowance (\$197.80 a week)
- Rent while studying is \$150, this implies multiple flatmates and living frugally

Hard coded:

- People complete their degrees in 4 years

#### **Assumptions for everyone:**

Adjustable:

- House price preference is the median national price (\$530,000)
- Living expenses linked to income but by assumption people live well within their means and share expenses throughout life
- Rent while working is \$250
- Mortgage term is 20 years
- Interest rate on savings is 2.1%
- Interest rate on borrowings is 13.99%

- Interest rate on mortgage is 5.3%
- Loan to value ratio is the current legislated 80%
- People are assumed to join a Moderate Kiwisaver scheme and enjoy 5.1% pa returns
- The discount rate is 6%

Hard coded:

- Share cost of buying a house with someone (parents, partner, friend)
- Buy only one house in lifetime and never move
- People buy a previously built house and receive the appropriate Homestart grant
- People prioritise living expenses and mortgage over repayment of overdraft
- Current LVR and Kiwisaver policy are assumed
- Contribute lowest amount to Kiwisaver (3%)
- Start Kiwisaver as soon as they start work

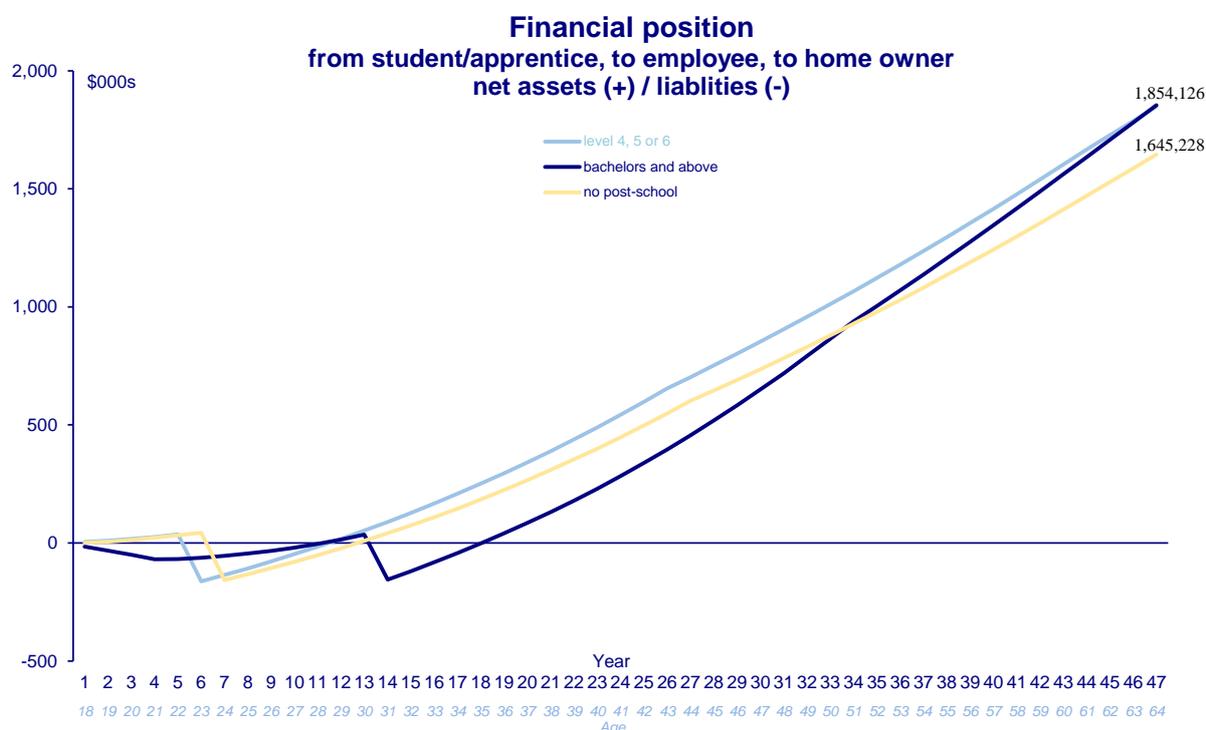
## 4 Results

Our modelling produced the following data summarised in Figure 4.1. What we observe is that under our assumptions the net financial position of degree holders and apprentices at the end of their careers is almost exactly the same.

This result is driven by the apprentices earning more, earlier, and buying a house earlier and contributing to Kiwisaver earlier.

We also observe that the people who obtain a level 2 secondary school qualification but otherwise no post school qualification have a net financial position which grows slightly slower than apprentices. This is driven by slightly lower earnings.

Figure 4.1 Main result



Another key result of our modelling which will be shown explicitly in the sensitivity analysis is the relative lower risk of an apprentice career path. We note that the apprentice in our model always ends up with the highest net financial position in the middle of their working careers. This is driven by them having paid off most of their mortgage and having no other debt. This implies that an apprentice career is lower risk.

### 4.1 Sensitivity

Below, in Figure 4.2, Figure 4.3, and Figure 4.4 we summarise the results of changing our assumptions. Figure 4.2 shows the sensitivity of the net financial position to the assumption of when people start contributing to Kiwisaver.

The baseline assumption is that people start as soon as they begin their career in full time work. What we observe is that the more a person delays contributions to Kiwisaver, the lower their net financial position at the middle and end of their careers.

Figure 4.2 Sensitivity to Kiwisaver start

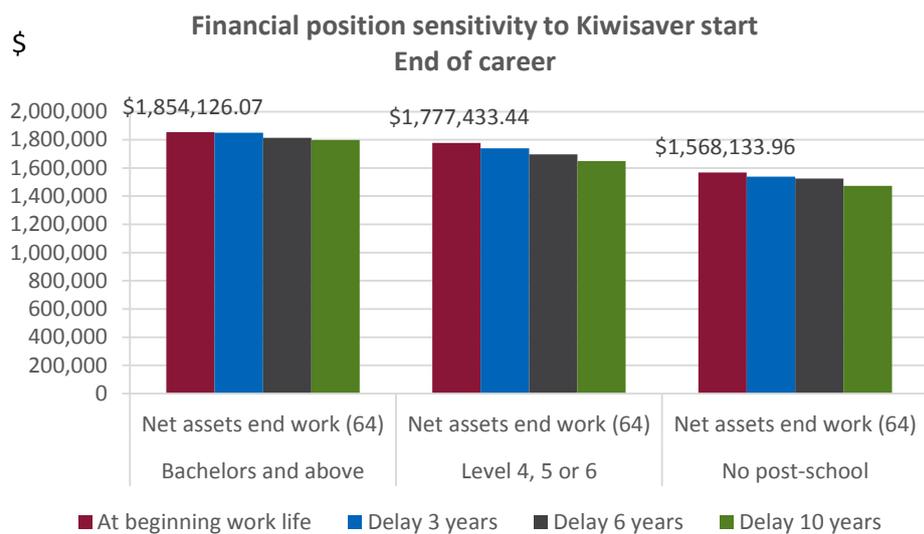
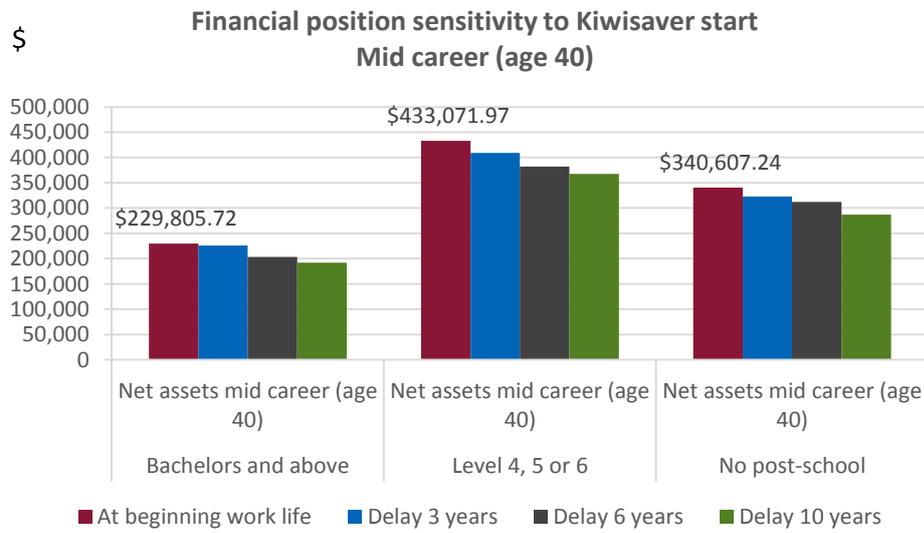
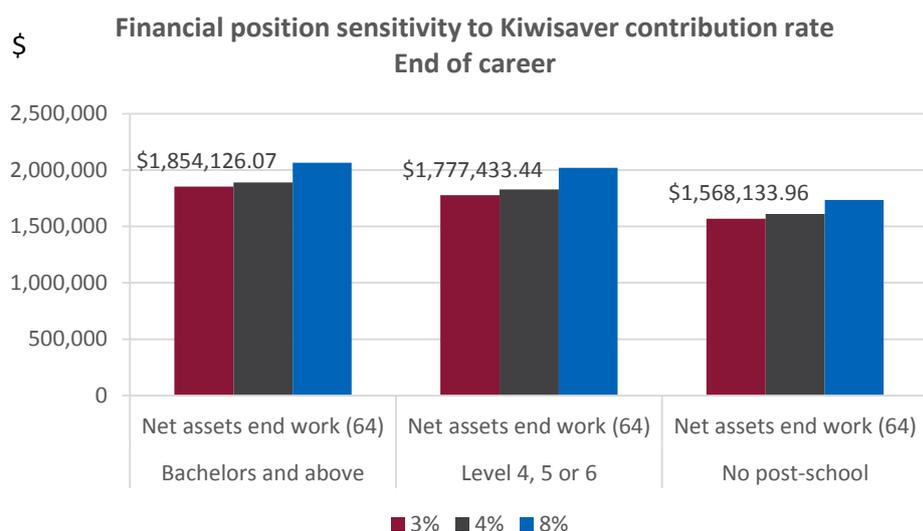
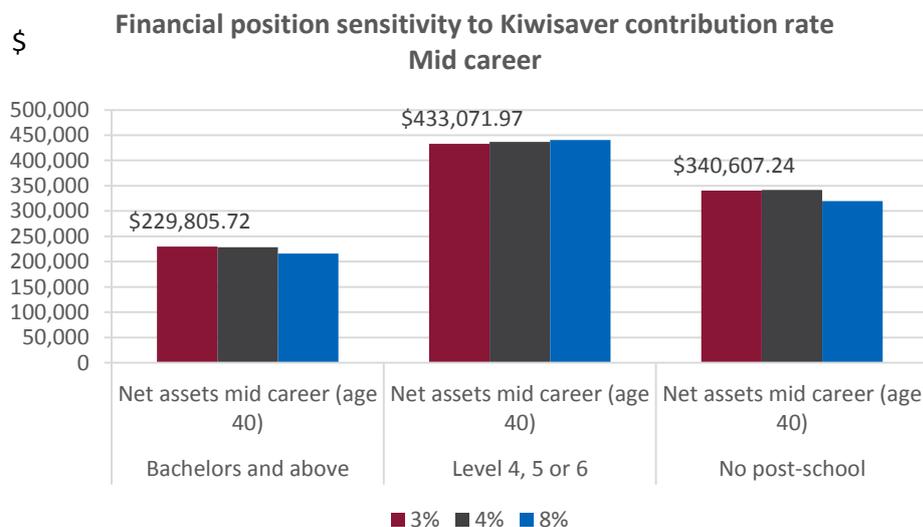


Figure 4.3 summarises our model’s sensitivity to changing the Kiwisaver contribution rate. As to be expected contributing more to Kiwisaver results in a greater net financial position at the end of one’s career.

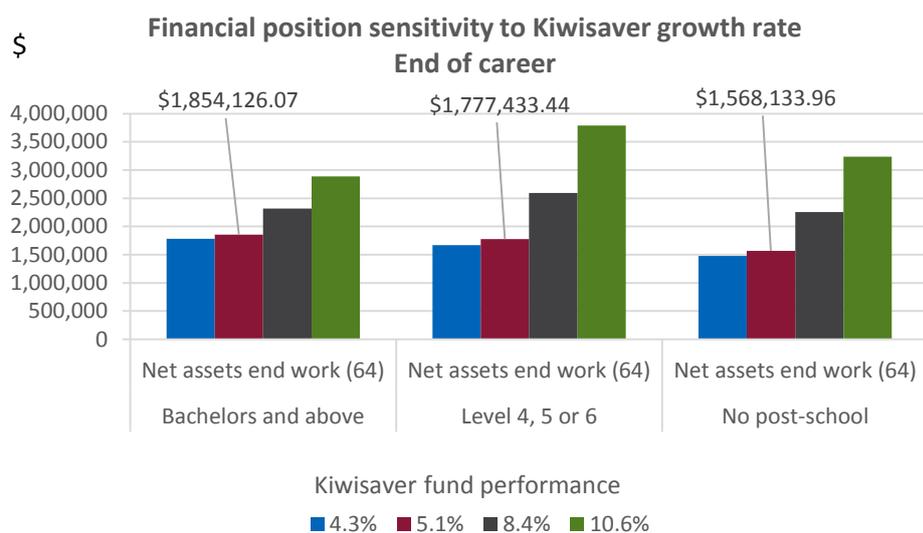
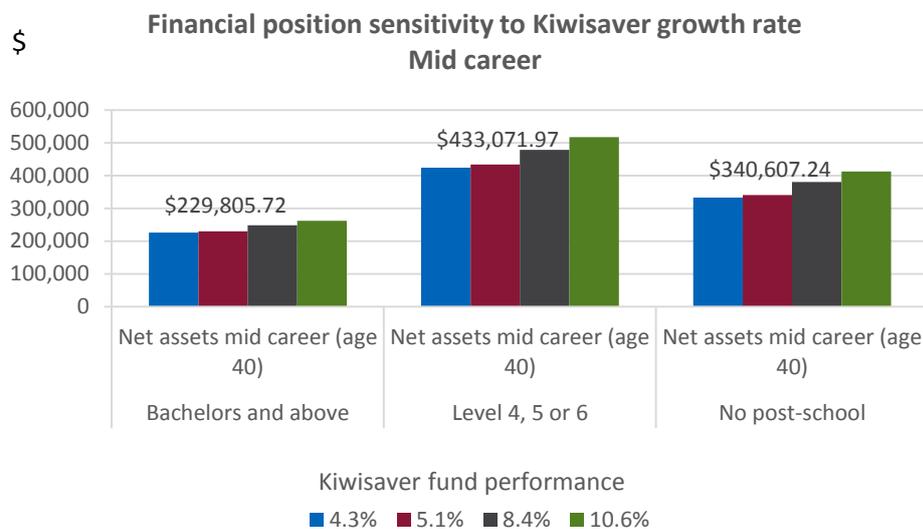
Figure 4.3 Sensitivity to Kiwisaver contribution rate



Finally, we summarise our model’s sensitivity to changes in the growth rate of the Kiwisaver fund assumption, in Figure 4.4.

In this analysis the result that degree holder ends up with a higher net financial position at the end of their career is reversed. Apprentices have the highest net financial position in this scenario. This is because apprentices contribute to Kiwisaver early in life and the returns compound for longer.

Figure 4.4 Sensitivity to Kiwisaver growth rate (fund type)



## 4.2 Scenarios

We postulate three scenarios:

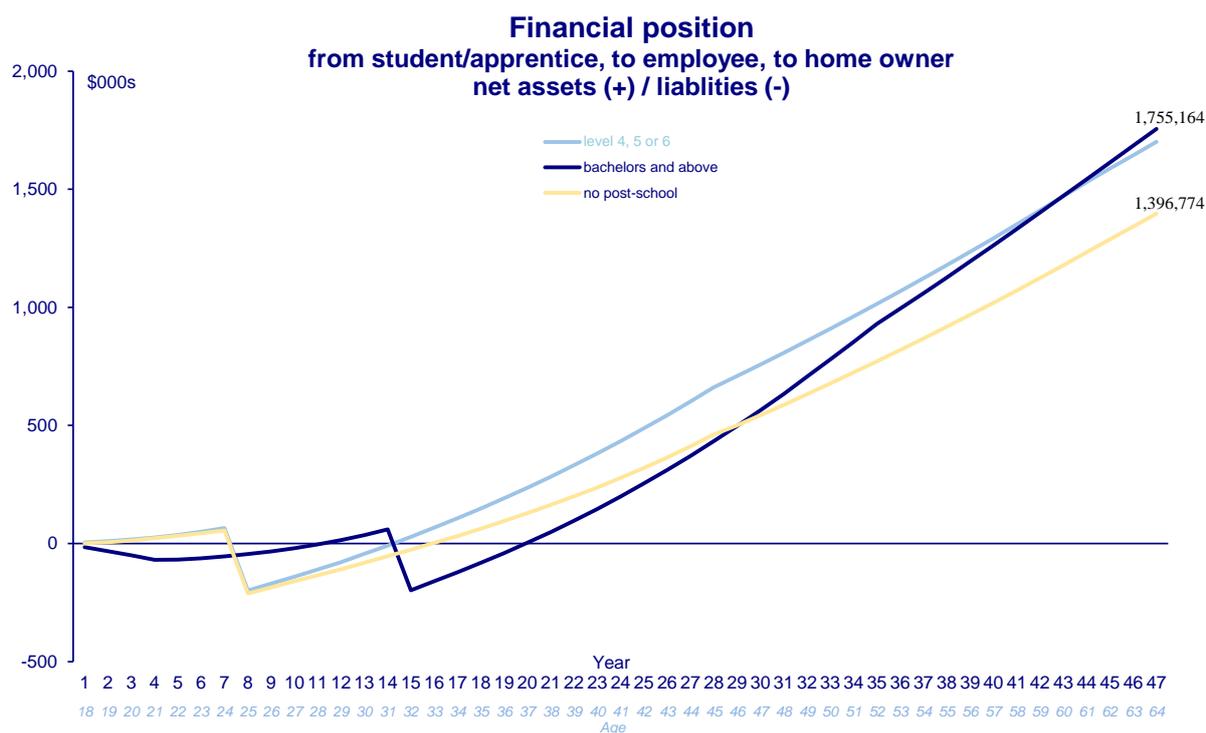
1. Scenario one: House price preference affordable but high (\$700k)
2. Scenario two: Student Loan high (+50% of mean) vs low (-50% of mean)
3. Scenario three: Mortgage term longest (30) versus shortest (10)

### Scenario One (house price \$700k)

Our first scenario considers what happens if our model’s agents seek to buy a very expensive house – around \$700k. in this scenario our agents end up with a lower net financial position than in the baseline. This is driven by less savings.

It is interesting that in our model any house price above around \$760k results in the overdraft of the apprentice and no post-school people exploding into millions. This is driven by the assumption that people pay off a mortgage (and other living costs) before paying off an overdraft.

Figure 4.5 Scenario one - house price \$700k



### Scenario two – student loan high vs low

We want to consider what happens when our model students elect to take on a larger or smaller than average student loan. For this we model two situations; the first, the student takes out a loan of 150% of the average loan amount. The second the model student takes out a loan 50% of the average loan amount.

The high student loan scenario is summarised in Figure 4.6. We see that taking out a larger than average student loan results in a lower than base scenario net financial position at the end of a student’s career. This is because with a higher student loan the student takes longer to pay off the overdraft incurred during study.

The low student loan scenario summarised in Figure 4.7 shows the opposite result, with the student achieving a much higher net financial position at the end of their lives. This result is driven by a lower personal overdraft.

Figure 4.6 Scenario two HIGH student loan

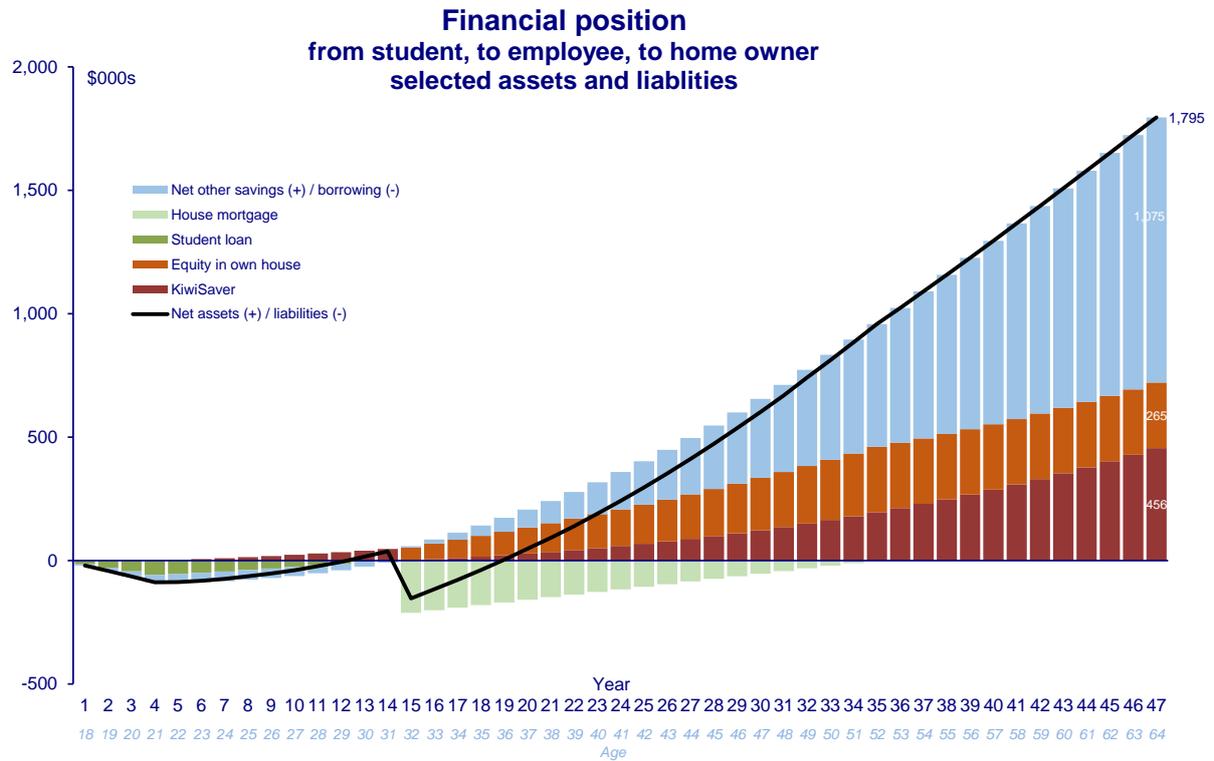
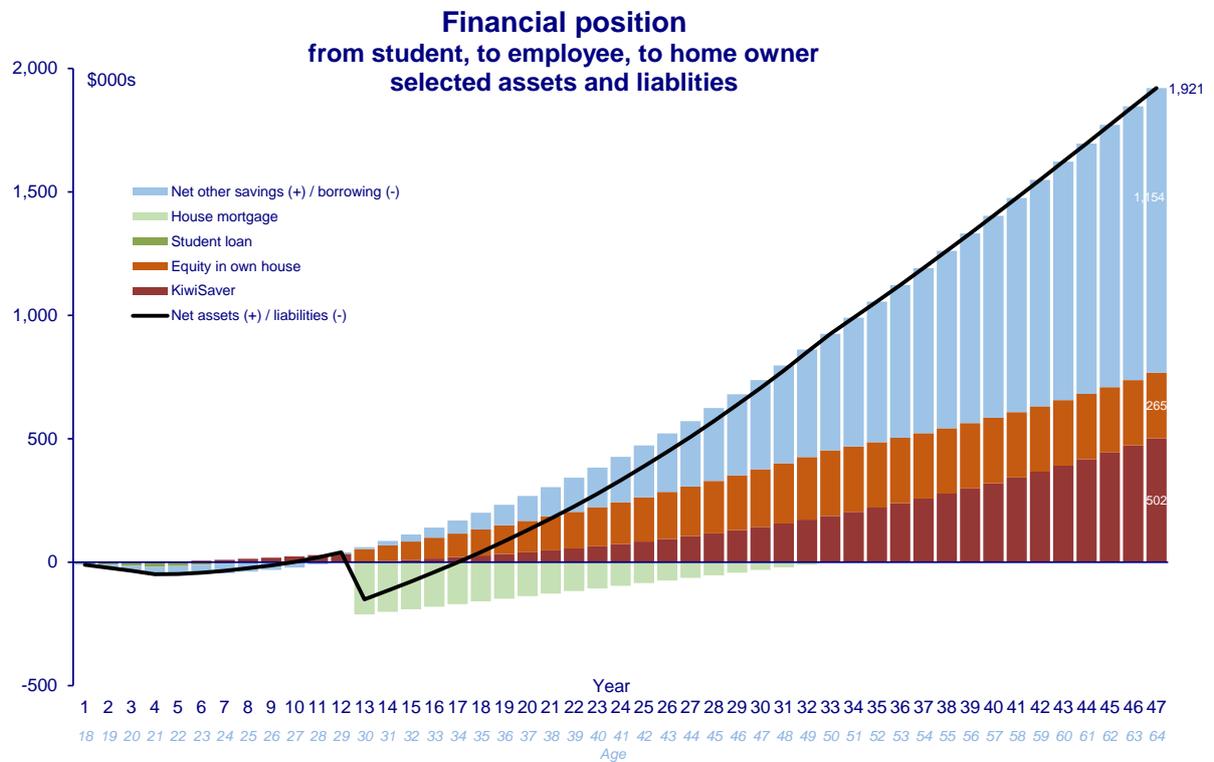


Figure 4.7 Scenario two LOW student loan



Scenario three: - mortgage term long versus short

Figure 4.8 Scenario three Long mortgage term (30 years)

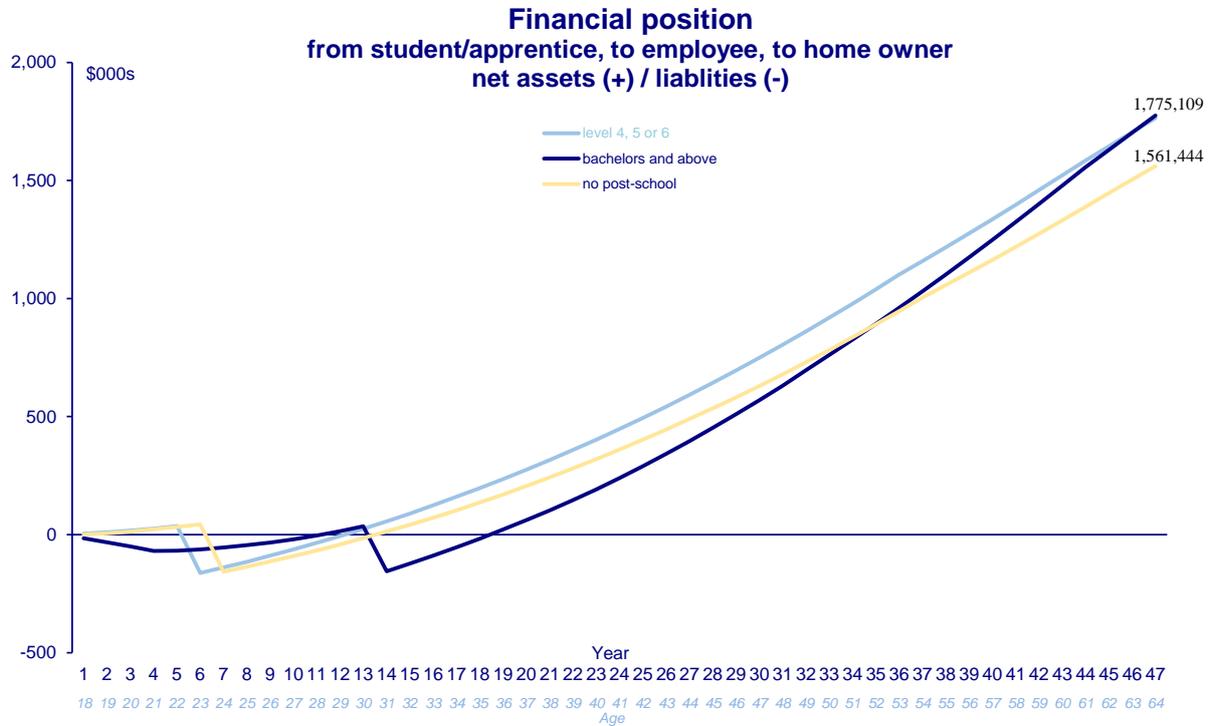
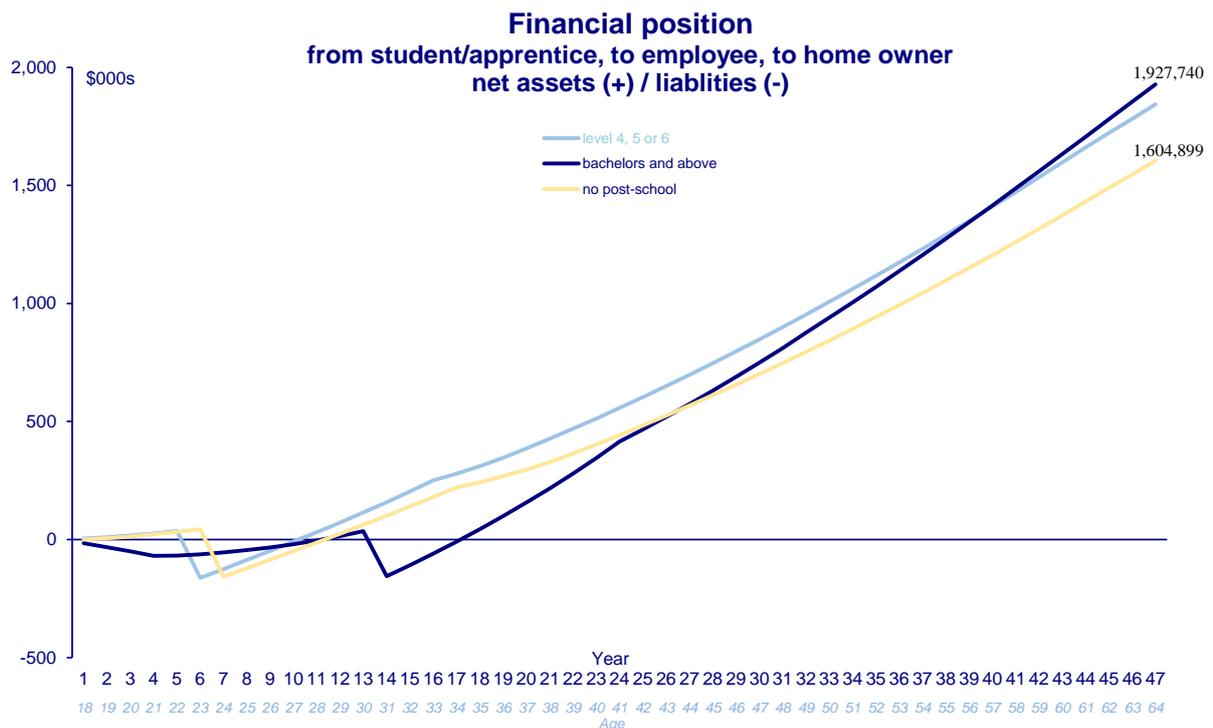


Figure 4.9 Scenario three short mortgage term (10 years)



## 5 Next steps

This report covers stage 2 of what has the potential to develop into a three stage project. In this stage report we have used level 4, 5 and 6 post-secondary qualifications as a proxy for apprentices. The potential stage 3 would augment this significantly by exploring specific occupations. These occupations will be ones known to require an apprenticeship to enter and work in.