



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Labour market outcomes of student support recipients



Labour market outcomes of student support recipients

This report forms part of a series called *Beyond tertiary study*.

Other topics covered by the series include how graduates' earnings change over time, labour market outcomes, education and economic growth, and qualifications and income.

Author:

Bhaskaran Nair, Senior Research Analyst
Email: bhaskaran.nair@minedu.govt.nz
Telephone: 64-4-463-7797
Fax: 64-4-463-8526

Acknowledgements:

The author gratefully acknowledges the support of Roger Smyth, Warren Smart and Miriam Urlich in their role as peer reviewers.

Disclaimer:

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 New Zealand.

The Student Loan Scheme Borrowers dataset combines information from the Ministry of Social Development, Inland Revenue and the Ministry of Education. The dataset has been approved by Statistics New Zealand as a data integration project. Only approved researchers who have signed Statistics New Zealand's declaration of secrecy can access the integrated data in the Data Laboratory. For information concerning confidentiality matters relating to this study, please contact Statistics New Zealand.

Published by:

Tertiary Sector Performance Analysis and Reporting
Strategy and System Performance
Ministry of Education

© Crown copyright
All rights reserved.
All enquiries should be made to the publisher.

This report is available from the Ministry of Education website:

<http://www.educationcounts.edcentre.govt.nz>

August 2008

ISBN (Web) 978-0-478-13909-9
ISBN (Print) 978-0-478-13908-2

Labour market outcomes of student support recipients

CONTENTS

1	SUMMARY	5
2	INTRODUCTION	7
	Overview	7
3	METHODS	8
3.1	The Data.....	8
3.2	Response variable.....	8
3.3	Primary variable of interest — Student support types	8
3.4	Demographic, institutional and employment variables	8
3.5	Scope and Limitations of the data	9
3.6	Underlying assumptions	9
4	RESULTS	11
4.1	Descriptive statistics.....	11
4.2	Logistic regression analysis results.....	13
4.4	Effect of gender and support type on the probability of earnings	15
4.5	Effect of age group and support type on the probability of earnings	16
4.5	Effect of qualification level and support types on the probability of earnings	16
4.6	Effect of ethnic group and support type on the probability of earnings	17
4.7	Effect of provider type and support type on the probability of earnings	18
4.8	Effect of prior activity and support type on the probability of earnings	19
4.9	Effect of fields of study, EFTS usage and industry and support type on earnings	20
4.10	Effect of post-study years.....	20
5	DISCUSSION	20
5.1	Interaction effect of explanatory variables with support types.....	21
6	CONCLUSIONS	22
	The key study findings showed that, looking at the effect of student support system on post-study labour market outcomes:	22
7	REFERENCES	23
	APPENDIX 1	24
	APPENDIX 1	24
	Cumulative logit model.....	24
	APPENDIX 2	25

List of Tables and figures

Table 3.1: Variables included in the cumulative logit model	8
Table 4.1: Percentage of individuals engaged in full-time study by student support type, completion status and income.....	9
Figure 4.1: Distribution of earnings by student support type and gender.....	10
Figure 4.2: Distribution of earnings above \$40,000 by student support type and qualification level	10
Figure 4.3: Distribution of earnings by student support type and ethnicity.....	11
Figure 4.4: Fitted probability of earnings by support type in six income bands.....	12
Figure 4.5: Fitted probability of earnings by support type and completion status	13
Figure 4.6: Fitted probability of earnings by support type and gender	13
Figure 4.7: Fitted probability of earnings by support type and age group for income band over \$40,000	14
Figure 4.8: Fitted probability of earnings by support type and qualification levels	15
Figure 4.9: Fitted probability of earnings by support type and ethnicity	15
Figure 4.8: Fitted probability of earnings by support type and provider type	16
Figure 4.9: Fitted probability of earnings by support type and prior activity	17
Table A2.1: Distribution of individuals engaged in full-time studies by student support type and completion status, in six income bands.....	22
Table A2.2: Distribution of individuals engaged in full-time studies by student support type and completion status, in six income bands.....	22

Note: All data used in the figures and tables in this report are sourced from Statistics New Zealand's integrated dataset on Student Loan Scheme Borrowers and student allowance recipients, unless otherwise specified.

1 Summary

Key findings:

- This study suggests that, although the student support system does not directly influence post-study earnings, it has an indirect effect on individual earnings.
- There is a very small increase in earnings probability among the 'loans only' group compared with those who take 'allowances only'. However, this is only marginally statistically significant. In practice, there is little difference in labour market outcomes for people with different student support types.
- The differences in earnings probability between 'allowances only' and 'loans only' support types may be attributable to the absence of factors like work experience and occupation, which are not included in the model.
- The likelihood of earnings for individuals who have successfully completed a qualification receiving any type of support types is more than those who don't complete a qualification within each support type.

This report presents the results of a study on the effects of different types of financial support on students' earnings in the years following tertiary study. The study centred on determining how economic outcome measures for student support recipients compared with outcomes for students receiving allowances only support. This report extends earlier research by the Ministry of Education on graduates' earnings three and five years after study and an analysis of the educational achievements of student support recipients.

The study looked at the earnings of individuals who used the Student Loan Scheme or who received a student allowance. The study drew on information gathered from 192,000 individuals who left tertiary study between 1999 and 2001. A statistical model was developed to represent the relationship between student earnings post-study and the type of student support received.

The financial student support comprised three categories - 'loans and allowances', 'loans only' and 'allowances only'. The analysis looked at each individual's annual earnings from wages and salaries three and five years after the completion of their qualification. The relationship between student support and individual earnings is also affected by such factors as demographic, individual study, institutional and employment characteristics. These variables were introduced into a logit model as predictor variables. The analytical approach used in this study was to compare the earnings of students in the 'allowances only' category with the earnings of two other groups — 'loans only', and 'both loans and allowances', keeping predictor variables constant.

This study found that the type of financial student support does not directly influence the labour market earnings. A marginal increase in earnings was found in the 'loans only' group, compared with students who received 'allowances only' or 'loans and allowances'. The apparent differences in earnings between the 'allowances only' and 'loans only' student support types may be attributable to the absence of influencing factors like work experience and occupation, and motivational/attitudinal factors (which may be influenced by personal and family circumstances), which were not included in the model.

The highest earnings were seen in the students who had borrowed student loans. The earnings of individuals who successfully completed a qualification was likely to be greater than for individuals who didn't complete their qualification for each of the three support categories. This finding reinforced earlier studies that concluded that completion of a qualification has the greatest influence on income. These studies also found that completion is influenced by personal, study-related and institutional factors, as well as student support type.

Gender and age on leaving tertiary study predominantly influenced earnings, but their test of

interaction with support types wasn't significant, suggesting that gender and age exerted their influence on the earnings independent of support types.

Across all support types, the higher the level of study, the higher was the predicted earnings. Individuals who had borrowed 'loans only' had the highest earnings probability. The earnings of individuals from the 'loans and allowances' type of student support was marginally lower than the other two groups for level 7 – 10 qualifications (bachelors and postgraduate).

The influence of ethnicity on earnings probability is significant, with a higher percentage of Europeans earning above \$40,000 in all support types. Again, the 'loans only' support type showed a higher probability of earnings than the other types of support across all ethnic groups.

There was considerable variation in earnings related to the type of education provider, but because of the small sample size for some providers, it is difficult to draw conclusions. However, the analysis showed that the probability of earnings in the 'loans only' support type was slightly higher than the other two types, especially in income bands above \$40,000 and with some advantage for universities.

In summary, this study suggests that, although the student support system does not directly influence post-study earnings, it has an indirect effect on individual earnings.

2 Introduction

Overview

The student support system helps make it financially possible for individuals to participate in tertiary education in order to enhance their skills and knowledge. In this way the system supports the accumulation of human capital by way of increased participation and improved educational outcomes. One of the objectives of the student support system is to reduce social disparity by making the benefits of education open to all who have the ability and desire to study. The expansion of tertiary education has raised challenges about the amount and direction of public investment for tertiary education. Increased financial constraints have forced government to focus on accountability in tertiary education. It is therefore important for government agencies to monitor and review the impact of student financial support on the economic benefits of tertiary education.

This report complements a previous study on the effect of the student support system on the educational achievements of recipients.¹ The integrated Student Loan Scheme Borrowers dataset was used to analyse the effects of different student support types on the labour market outcomes. The types of student support included the student allowances and student loan schemes. The outcome measure used was the individual's annual earnings from wages and salaries three and five years after the completion of their qualification. The economic outcome variable — earnings from salaries and wages — was classified into six income bands. The key explanatory variable used was the support type, with three categories namely 'loans and allowances', 'loans only' and 'allowances only'. The relationship between student support type and individual earnings is also affected by the individual study, institutional and employment characteristics. Ten factors representing these characteristics were used in the model as control variables.

The primary objective of this study centred on answering two policy questions:

- How do the various economic outcome measures for student support recipients compare with other groups?
- How far is the student support system able to contribute to equity in terms of the economic outcomes for individuals who participate in tertiary education?

The study sample consisted of cohorts who left tertiary study between 1999 and 2001 having accessed the student allowances and student loan schemes. The analysis related their student support status to earnings three and five years after completion of tertiary study. Here, the completion of study means that the students left study, whether they had successfully completed their studies or not. The analytical approach consisted of analysing the probability of earnings of the 'allowances only' support type, compared with the outcomes of two other support types — 'loans only', and 'both loans and allowances' using six income bands.

The next part of this report gives a description of the methods of analysis and the data used. This is followed by an interpretation of the analytical outputs from different models. A discussion of the results, interpretation and their context is then provided. The last section deals with conclusions of the study and an attempt is made to interpret the results in line with the study objectives. The report finishes with references and Appendices.

¹ Nair, B. (2008) Educational achievement of student support recipients, Wellington: Ministry of Education.

3 Methods

3.1 The Data

This study used data from the integrated Student Loan Scheme Borrowers dataset, managed by Statistics New Zealand. The data set covered approximately 192,000 individuals who were in the leaving cohorts spanning 1999 and 2001 and who had used the student allowances and student loan schemes.² The earnings from wages and salaries of these individuals three and five years after study were used as an outcome variable. The wages and salaries of individuals for the years 2002 to 2005 were used so as to cover the earnings three and five years after study. Individuals engaged in part-time study were not included because only individuals engaged in full-time study are eligible to receive student allowances. The dataset provided a unique opportunity to examine the relationship between student support types and labour market outcome because it contained national level 'real life' data.

To establish a relationship between student support types and their post-study earnings, a cumulative logit model with interaction effects, that included variables correlated with both support types and earnings was developed.³ Previous studies on the relationship of earnings related to educational, demographic and employment characteristics by Nair (2006) and Nair (2007) used a generalised logit model. To determine the impact of support types on post-study earnings a basic cross-sectional estimate is calculated from the following equation:

$$C_i = \alpha_i + \beta * Atype_i + \theta * X_i + \gamma_{ij} * Atype_i * X_i$$

Here, C_i is a measure of an individual's earnings, with six categories. $Atype_i$ is the type of student support accessed by the individual, and X_i is a vector of individual covariates namely, gender, age, ethnicity, provider, qualification level, field of study, prior activity, industry of employment, nature of study. The coefficients α_i , β , θ and γ_{ij} are required to be estimated through the model.

3.2 Response variable

The economic outcome variable — annual earnings from salaries and wages, was a continuous variable measured in dollars. This variable was classified into six category levels - 1: Zero income, 2: \$0 to \$20,000, 3: \$20,001 to \$40,000, 4: \$40,001 to \$60,000, 5: \$60,001 to \$80,000 and 6: greater than \$80,000. All earnings with a negative outcome were merged and categorised under 'zero income'. The earnings corresponding to three and five years post-study are considered in the analysis. The post-study earnings of individuals from different years are standardised after deflating by the Labour Cost Index (LCI) in 2005 dollar terms.

3.3 Primary variable of interest — Student support types

The primary objective of this study was to measure the impact of different student support types on post-study earnings. Hence, the support type is the main predictor of interest. There were three student support types: those who received a student allowance only — 'allowances only'; those who borrowed a student loan only — 'loans only' and those who both borrowed and received a student allowance — 'loans and allowances'.⁴

3.4 Demographic, institutional and employment variables

All predictor variables were measured in the year that the student left study (leaving cohort), irrespective of whether they completed their qualification successfully or not. To reduce the bias in the estimate of the support type effect on the post-study income, it was necessary to control for all predictor variables correlated with the support types. If these factors are ignored, the comparison of different allowance types is then 'confounded' because the difference in earnings status among ethnic

² The details of the student allowances and student loan schemes are explained in the previous report by Nair (2008).

³ See Appendix 1 for more technical details on cumulative logit model.

⁴ Although the 'no loans and no allowances' group was considered in (Nair (2008)), it was not included in this analysis as earning data for this group was not available in the Student Loan Scheme Borrowers dataset.

groups, gender etc may influence the overall effects. Hence, external factors responsible for the difference in earnings among different student support types were adjusted in the analysis.

Consistent with earlier research, demographic, study and employment variables were included in the analyses (Nair, 2007). The predictor variables of age, gender, ethnicity, qualification level, field of study, institution, prior activity, industry of employment, completion status are all important variables influencing the individual's post-study earning. A list of the demographic, study and institutional characteristics included in this analysis is shown in Table 3.1. The continuous variable — 'equivalent full-time student unit usage'— is entered into the model as one of the covariates. Interaction effects of support type by control factors were added to the model to adjust for indirect effect of control variables on the earnings through support types.

Table 3.1: Variables included in the cumulative logit model

Variables	Category levels	Reference Category
Earnings (Response variable)	Zero = 1; 0 to 20,000 = 2; 20 to 40,000 = 3; 40 to 60,000 = 4; 60 to 80,000 = 5; > 80,000 = 6;	20 to 40k
Allowance types	Loan only, Loan and Allowances; Allowances only	Allowances only
Age	15-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60 and > 60	15-20
Gender	Male ; Female	Male
Ethnic group	1= European, 2=New Zealand Maori, 3=Pacifica, 4=Asian (Chinese and Indians), 5=Others, 6=Unknown	European
Qualification level	01=Certificate L1-3; 02= Certificate 4; 03= Certificate L5-6; 04=Bachelors degree; 05=PG Diploma; Masters and Doctorate	Bachelors degree
Completion indicator	Complete; Incomplete	Incomplete
Field of study	01=Natural and Physical Sciences; 02=Information Technology; 03=Engineering and related technologies; 04=Architecture; 05=Agriculture and Environmental Studies; 06=Health; 07=Education; 08=Management and Commerce; 09=Society and Culture; 10=Creative Arts; 11=Food, Hospitality and personal services; 12=Mixed Field Programmes	Agriculture and Environmental Studies
Industry of employment	Accommodation=1; Agriculture=2; Construction=3; Cultural & Recreation=4; Education=5; Finance and Insurances=6; Government & Defence=7; Health & Community services=8; Manufacturing=9; Mining, Electricity =10; Personal and Other services=11; Property and Business=12; Retail trade=13; Telecommunication=14; Transport and Storage=15;	Agriculture
Prior activity type	01=Secondary School student; 02=; 03=Wage or Salary worker and Self employed; 04=tertiary student; 05=House person or retired, Non-employed/Beneficiary; 06=Overseas	Secondary School student
Providers	Polytechnics; College of Education; Universities; Wananga; TEP, Others	Universities
Equivalent full time study	Continuous variable	

3.5 Scope and Limitations of the data

Individuals were grouped into three categories based on the nature of student support type as explained in Nair (2008). The 'no loans and no allowance' category was not included as the post-study income for this group is not available in the dataset. Financial support in the form of scholarships was not included in this study. Individuals who declared their residence as overseas were also excluded. A small number of records that did not match the information from various data providers were excluded. The findings of this study should not be over generalised, given the small sample of 'allowances only' category, compared with the size of the other two types. Additionally, the data utilised in this study limited the number of variables available for analysis.

3.6 Underlying assumptions

- The student support scheme gives every tertiary student a 200-week entitlement to student allowances, provided they are full-time students enrolled in an approved course of study of at

least 12 weeks' duration and they meet the targeting criteria. There are instances where individuals switch from one allowance type to another due to their changing circumstances.

- All individuals who received student allowances are treated as full-time students, although they may have switched from full-time to part-time study during the study period.
- All individuals who have borrowed a student loan, irrespective of the length of borrowing period, are treated as loan borrowers.

4 Results

4.1 Descriptive statistics

The sample dataset covered a total of 192,000 students who were engaged in full-time study and accessed the student loan or student allowances schemes. As seen from the descriptive statistics in Table 4.1, 38 percent of students engaged in full-time study borrowed student 'loans only', 55 percent received 'loans and allowances' and 6 percent received 'allowances only'.

Table 4.1: Percentage of individuals engaged in full-time study by student support type, completion status and income

Support type	Income band	Completed	Incomplete	Total
Allowances Only	Zero	6.2	9.5	7.3
	< \$20,000	24.9	29.3	26.3
	\$20,001-\$40,000	34.0	37.3	35.0
	\$40,001-\$60,000	27.7	18.6	24.8
	\$60,001-\$80,000	5.6	3.9	5.0
	> \$80,000	1.6	1.4	1.5
Total		6.9	5.4	6.3
Loans and Allowances	Zero	9.9	14.2	11.3
	< \$20,000	30.0	32.7	30.8
	\$20,001-\$40,000	32.2	37.0	33.8
	\$40,001-\$60,000	22.9	13.5	19.8
	\$60,001-\$80,000	3.8	2.0	3.2
	> \$80,000	1.2	0.6	1.0
Total		59.7	48.2	55.4
Loans Only	Zero	9.7	14.7	11.9
	< \$20,000	28.0	32.2	29.9
	\$20,001-\$40,000	34.9	38.9	36.7
	\$40,001-\$60,000	21.4	11.7	17.0
	\$60,001-\$80,000	4.2	1.9	3.2
	> \$80,000	1.9	0.7	1.3
Total		33.5	46.4	38.3
Total		62.6	37.4	100.0

Notes: The earning percentages are an aggregate of three and five years post-study from the raw data. Zero income includes negative income reported by self employed, individuals who have gone overseas and those who are unemployed.

Source: Statistics New Zealand, integrated Student Loan Borrowers Scheme and student allowances datasets, 2007.

Of the total sample, 63 percent of students successfully completed a tertiary qualification. The earnings distribution patterns from the three support types are different. Individuals, who have completed a qualification, were more likely to achieve a higher income than those who did not complete, irrespective of the support type received. For example, the percentage of earnings above \$40,000 were 35, 28 and 28 percent for 'allowances only', 'loans and allowances' and 'loans only' respectively in completed group. The corresponding percentages in the incomplete group were 24, 16 and 14 percent.

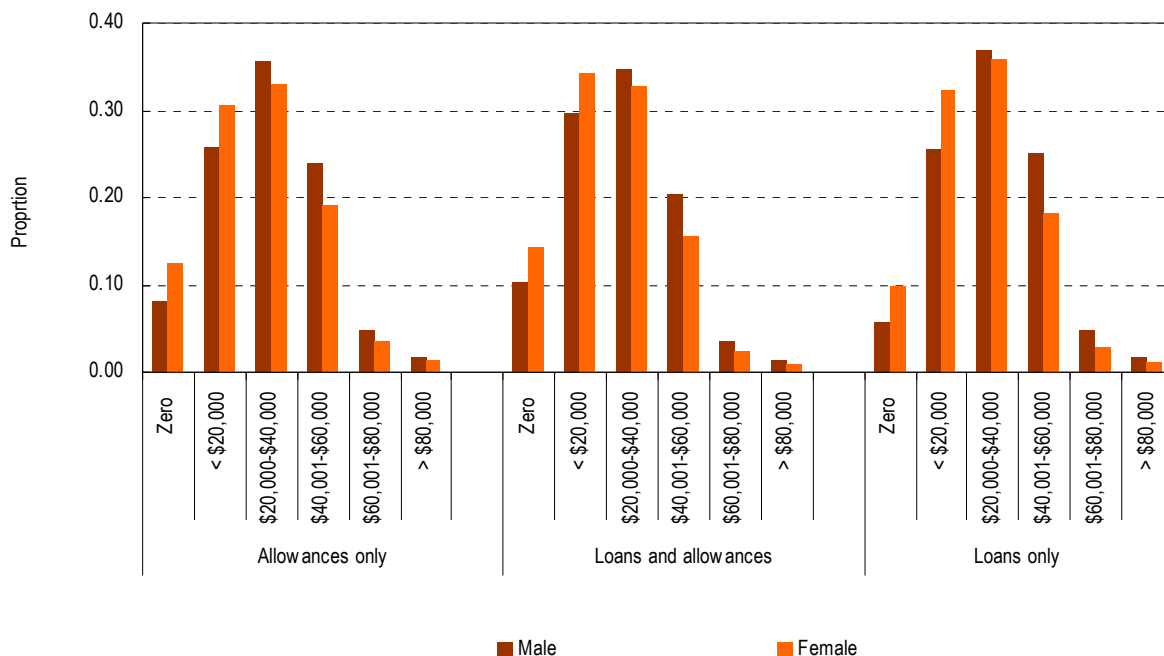
The percentage of people with zero income in the completed group was 10 percent in the 'loans and allowances' and 'loans only' groups compared with 6 percent in the 'allowances only' group.⁵ The corresponding percentages of zero income among those who did not complete were 14, 15 and 10 percent respectively. Many of those who return zero income will be people who live overseas or are taking time out of the workforce to care for children.

The earnings distribution observed due to the demographic characteristics of gender, qualification levels, and ethnic group among students from the three student support types are shown in the following graphs. Figure 4.1 suggests that the earnings of individuals from the 'loans and allowances'

⁵ The 'zero' income category includes those who have left for overseas.

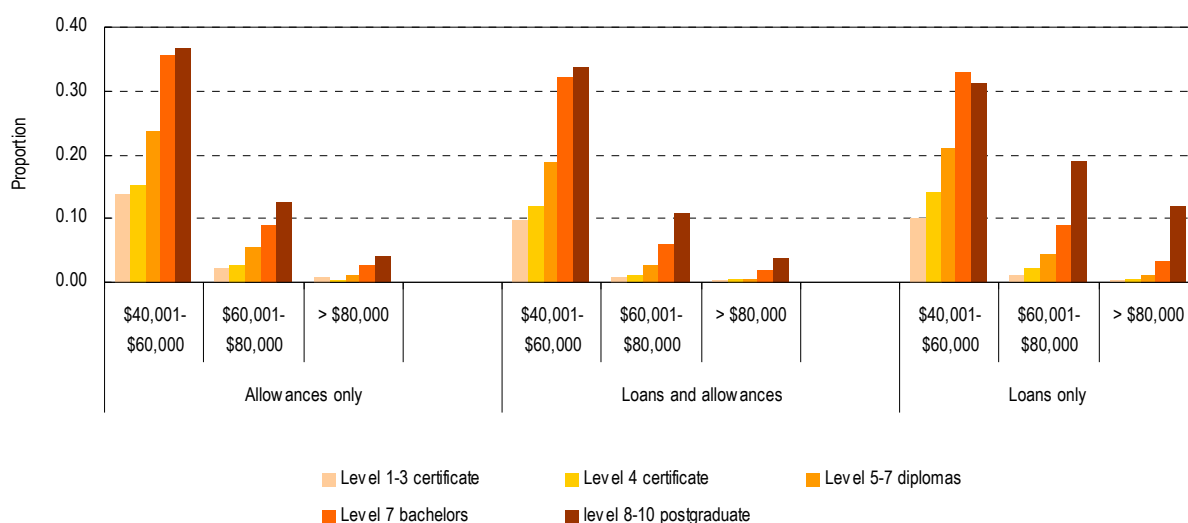
type were apparently lower than the other two types, while the 'loans only' group appears to have the highest earnings distribution. All three support types showed similar trends — a higher percentage of females were earning below \$40,000, compared with males. A higher percentage of males and females in the 'allowances only' and 'loans only' types, earned above \$40,000, compared with males and females in the 'loans and allowances' type. A total of 31 percent of males and 24 percent of females from the 'allowances only' type showed an annual earnings above \$40,000. This compares with 25 and 19 percent for 'loans and allowances', and 32 and 22 percent for 'loans only' types.

Figure 4.1: Distribution of earnings by student support type and gender



The earnings distribution for the three support types by qualification level (whether successfully completed or not) is shown in Figure 4.2. The proportion of earnings within each income band, for those who studied at postgraduate level and in the 'loans only' group was higher than the other two types. The percentage of individuals who studied for a bachelors degree and achieved earnings above \$40,000 was 48, 40 and 45 percent for 'allowances only', 'loans and allowances', and 'loans only' respectively.

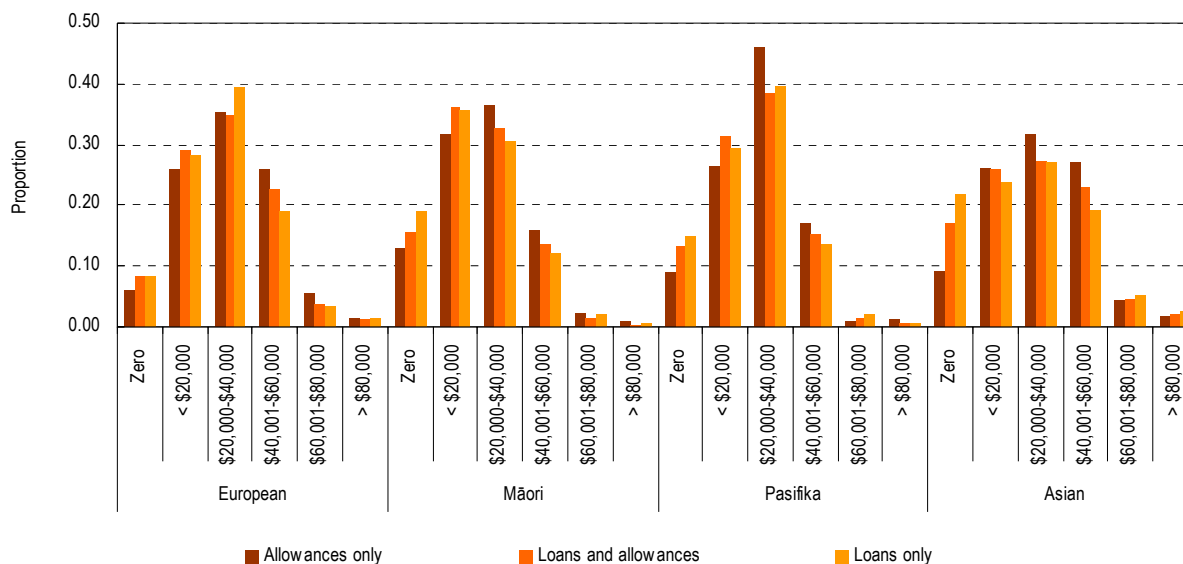
Figure 4.2: Distribution of earnings above \$40,000 by support type and qualification level



The percentage for those who studied at postgraduate level was 53, 48 and 63 for 'allowances only', 'loans and allowances' and 'loans only', respectively. This indicates that the earnings of individuals from the 'loans and allowances' type of student support were marginally lower than the other two types. Figure 4.3 shows the earnings pattern by ethnic group in the different support types. The

percentage of earnings above \$40,000 in the ‘allowances only’ support type was 33, 19, 19 and 33 for Europeans, Māori, Pasifika and Asians, respectively. This compares with 28, 16, 17 and 30 percent in the ‘loans and allowances’ type and 24, 15, 16 and 27 percent in the ‘loans only’ type. The ‘allowances only’ type of student support has a marginal advantage over other types in earnings across all ethnic groups.

Figure 4.3: Distribution of earnings by support types and ethnicity



In summary, the descriptive statistics provided a comprehensive picture of earning patterns by different demographic, study factors and ethnicity and the effect of student support on the earnings in the raw data. The overall descriptive statistics results indicated that those who received ‘allowances only’ earned a marginally higher income than the ‘loans only’ and ‘loans and allowances’ support types.

The following section explains how these results get modified when intervening factors are controlled using logistic regression modelling.

4.2 Logistic regression analysis results

The relationship between support types with the earnings observed in the raw data is also found in the logistic regression analysis results. The results produced from the logistic regression analysis allow an examination of the effects of student support types on the earnings distribution, controlling for all other factors. The logistic regression results with both the interaction effects and main effects are shown in Table A2.2 (Appendix 2). The results presented in this section are for the interaction effects model only.

The coefficients reported in Table A2.2 (Appendix 2) should be interpreted as a change in the log-odds of earnings falling into or above an income band resulting from a change from support type ‘allowances only’ to any other types, holding other variables constant (Peng *et al.* 2002). A positive regression coefficient indicates a positive association – that is, the likelihood of falling into (or above) a particular income band *increases* as the earning level *increases* when the support type category switches from ‘allowances only’ to other types. If the coefficient is negative, the likelihood of earning in different income bands *decreases* as the earnings level *increases*.

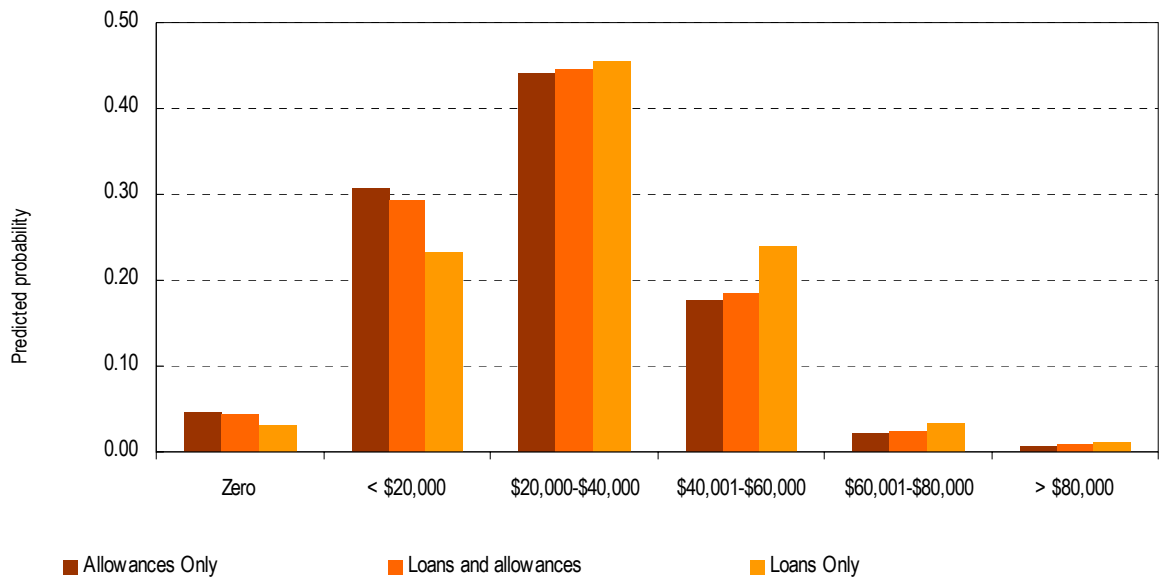
To present results for different subgroups of interest, the predicted probabilities of earnings are estimated from the logit results and discussed in the following sections. For ease of interpretation, the interaction effects are presented graphically. All comparisons in the model is made with reference to a European male in the age group 15-20 years earning zero income three years after completing bachelors degree from a university as a full-time student receiving student support ‘allowances only’, whose prior activity was secondary school student.

The logistic regression results showed that the effect of the ‘loans and allowances’ support type on the likelihood of earnings is positive but not significant ($p > 0.05$) all other factors being equal. This

suggests that the likelihood of earnings falling into or above any income band is similar to the likelihood in the 'allowances only' type. The coefficients linked to 'loans only' showed a positive and marginally significant effect ($p = 0.052$), a finding that suggest that log-odds of earnings in different income bands increased slightly as the earnings level increased compared with the 'allowances only' type. In effect, the regression analysis shows that the 'loans only' group have slightly higher earnings, but that this effect is only marginally significant.

Figure 4.4 provides the same information - the probability of earnings being over \$40,000 for the 'loans only' type (28 percent) was higher, compared with the 'loans and allowances' (21 percent) and 'allowances only' (20 percent) support types.

Figure 4.4: Fitted probability of earnings by support types in six income bands

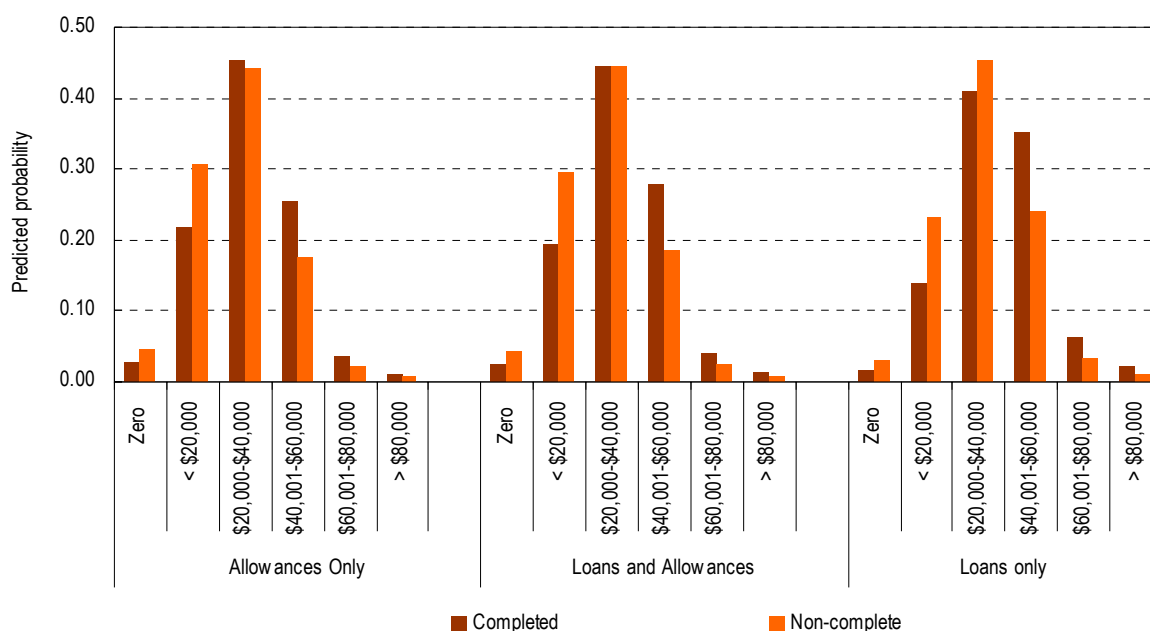


Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

4.3 Effect of completion status and support types on the probability of earnings

A positive and significant regression coefficient for completion status showed that the likelihood of earnings falling into or above a particular income band increased as the support type switches from 'allowances only' to any other type (Table A2.1, Appendix 2).

Figure 4.5: Fitted probability of earnings by support types and completion status



Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

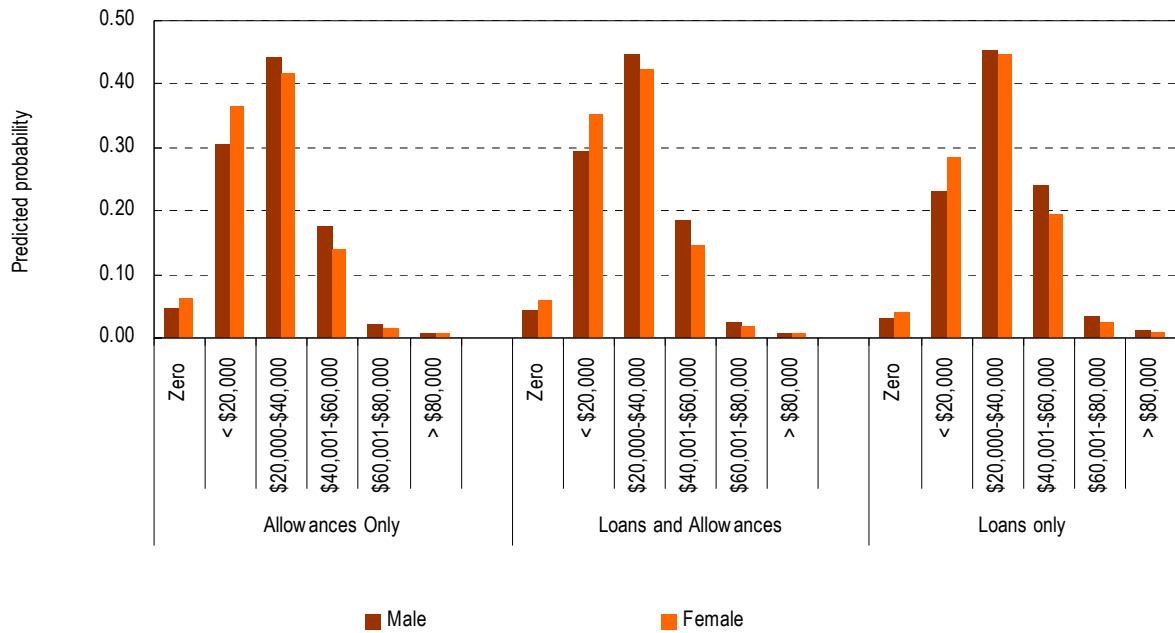
The test of interaction terms for completion status and support type 'loans only' showed a significant and positive impact ($p < 0.05$) with reference to 'allowances only'.⁶ The interaction effect of support type with completion status for 'loans and allowances' was not significant ($p > 0.05$). This result suggests that 'loans only' type significantly influenced the earnings through completion status. As shown in Figure 4.5 individuals who have completed a qualification and borrowed student loans are more likely to earn over \$40,000, compared with the 'allowances only' support type.

4.4 Effect of gender and support type on the probability of earnings

Gender had a highly significant effect on earnings (Table A2.3, Appendix 2). The probability of earnings falling into or above a particular income band significantly decreased for females, compared with males. The test of the interaction terms of support type and gender was not significant, suggesting that the earnings probabilities in different income bands are similar to the earning probabilities of reference category. The predicted probability of earnings shown in Figure 4.6 illustrates this fact. The predicted probability for 'loans only' was slightly higher than for the 'allowances only' and 'loans and allowances' types, especially in income bands above \$40,000 within each gender.

⁶ The effect of support types in each income band, in the presence of interaction, is estimated by adding the coefficients of interaction linked to the factor and the intercepts of the corresponding income bands to the main effect of support types.

Figure 4.6: Fitted probability of earnings by support types and gender



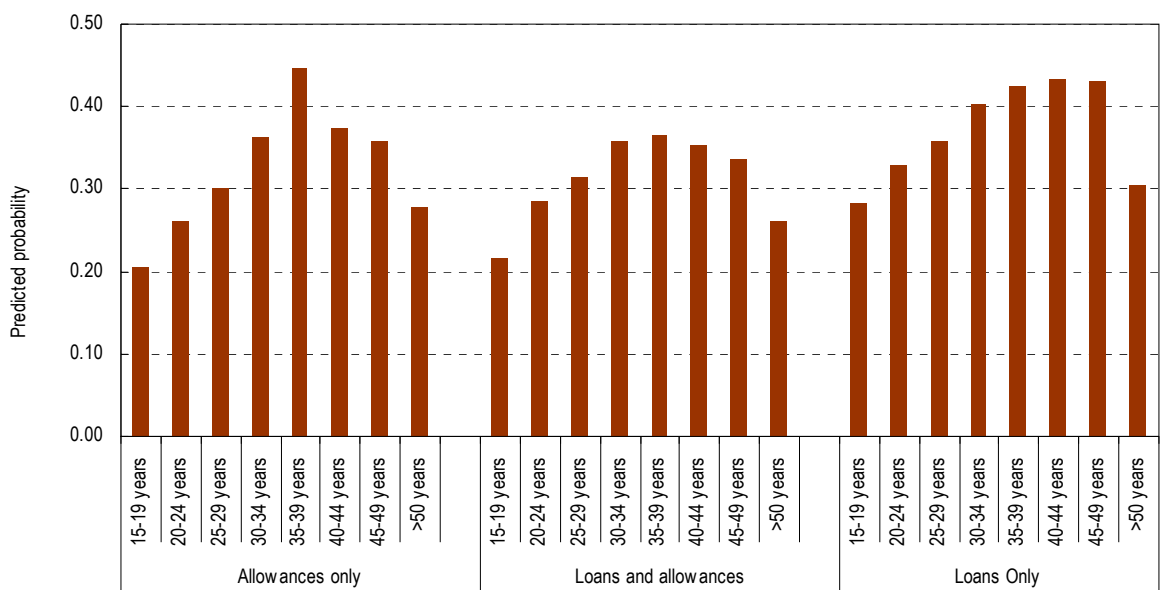
Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

4.5 Effect of age group and support type on the probability of earnings

Age had a statistically significant effect on earnings, independent of support type, as expected. The test of interaction between age and support type is not significant, except for age 35-39 years within 'loans only' type, suggesting that support types and age effects are independent.

As seen from figure 4.7, the predicted probability of earnings above \$40,000 for 'loans only' type is higher in all the age groups compared with the 'allowances only' and 'loans and allowances' types. But the difference among support types in earnings probability is not found statistically significant. In effect, the result indicated that although age has predominant influence on the earnings its effect is not influenced by the support types, keeping other factors constant.

Figure 4.7: Fitted probability of earnings by support types and age for income over \$40,000



Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

4.5 Effect of qualification level and support types on the probability of earnings

Independent of support type, the effect of qualification level on the probability of earnings was statistically significant at $p < 0.05$ (Table A2.2, Appendix 2). Except for qualification levels 8-10 (postgraduate), the effects were negative, indicating that the likelihood of earnings falling into or above a particular income band decreased significantly with reference to level 7 bachelors. The test of interaction between qualification level and 'loans only' showed a significant effect except for level 4 certificate. However, the interaction effect between 'loans and allowances' and different qualification levels was not significant compared with 'allowances only'.

Figure 4.8: Fitted probability of earnings by support types and qualification levels



Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

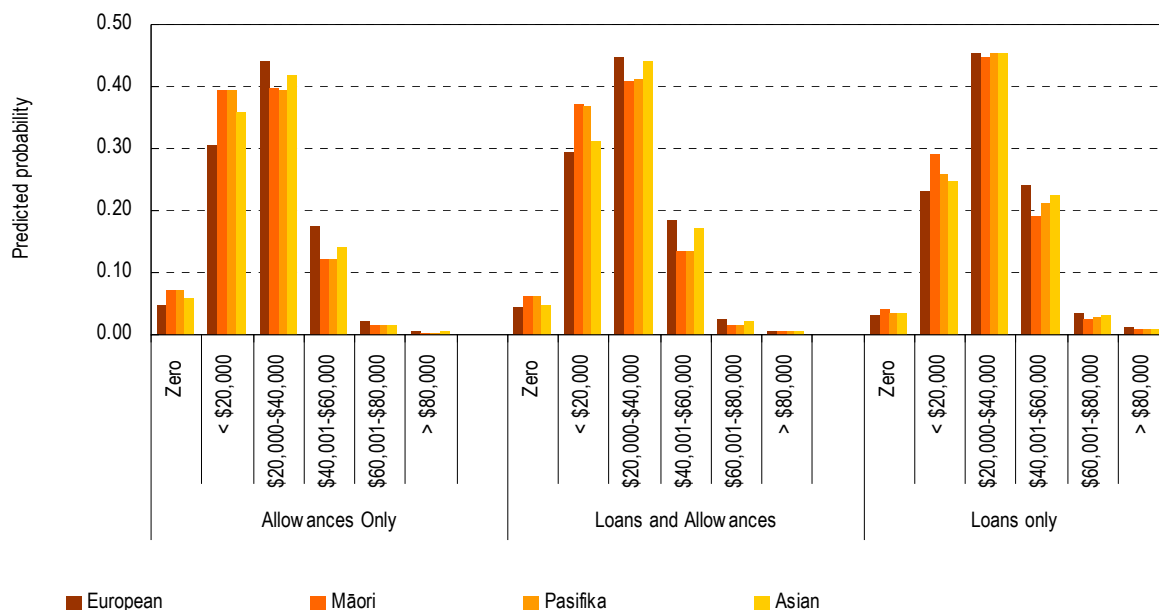
Figure 4.8 shows the predicted probability of earnings by qualification level and support type. The figure highlights the fact that the 'loans only' support type has a higher probability of earnings in income bands above \$40,000, especially above bachelors level, than for the 'loans and allowances' and 'allowances only' types. There was no apparent difference in earnings seen between the 'loans and allowances' and 'allowances only' types, keeping all other factors equal.

4.6 Effect of ethnic group and support types on the probability of earnings

Ethnicity had a significant effect on the probability of earnings ($p < 0.05$), but, except for the 'Pasifika' group, independent of support type. Compared with the reference group – European – the likelihood of earnings falling into or below a particular income band decreased within each ethnic group. But the interaction between support type and ethnic group was not significant ($p > 0.05$), suggesting that earnings due to ethnic differences were not influenced by support type.

Figure 4.9 confirms that the probability of earnings being above \$40,000 in the 'loans only' support type is marginally higher than for the 'allowances only' and 'loans and allowances' types. The result suggests that the ethnic differences have a predominant effect on the earnings rather than the effect of support types, keeping all other factors constant.

Figure 4.9: Fitted probability of earnings by support types and ethnicity



Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

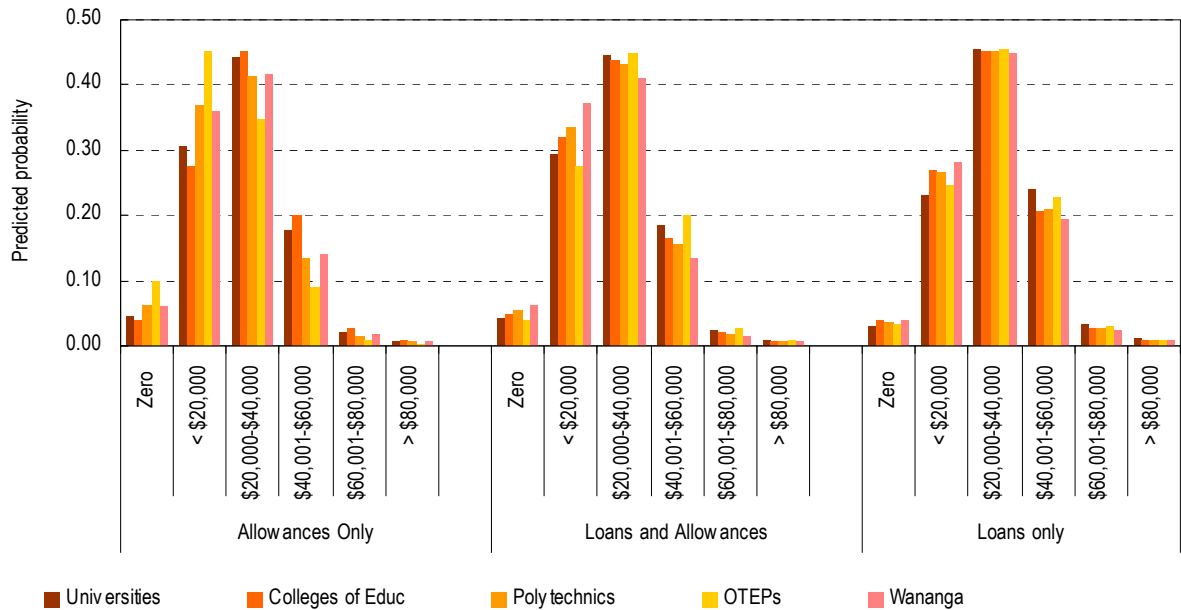
4.7 Effect of provider type and support types on the probability of earnings

The influence of the variable provider type on the probability of earnings showed some interesting results. A significant difference in earnings probability was found between universities and polytechnics, independent of support type effects, with those who had studied at a university tending to earn more than those who had studied at a polytechnic.

Colleges of education, other providers of tertiary education (OTEPs) and wananga were not statistically different from universities ($p > 0.05$). Small sample size, leading to a higher standard error, may help explain why the earnings probabilities for OTEPs and wananga were not significantly different from universities. However, it is found that the magnitude of effect between universities and colleges of education was very small compared with the effects found in other institutions.

In contrast, the interaction effect between support type and provider type did not show statistically significant differences. The probability of earnings in the 'loans only' type was slightly higher than either the 'allowances only' or 'loans and allowances' types especially in income bands above \$40,000 with some advantage to universities.

Figure 4.8: Fitted probability of earnings by support types and provider type

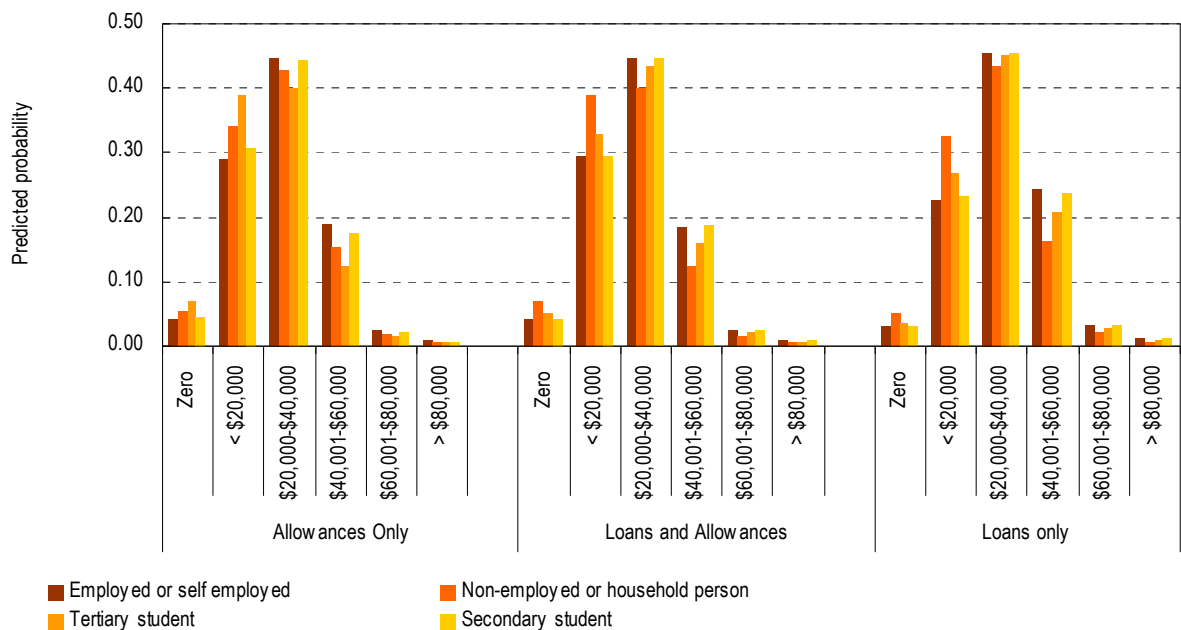


Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero income three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

4.8 Effect of prior activity and support types on the probability of earnings

Activity prior to taking up tertiary studies is an important factor influencing earnings. Independent of support type, the earnings of those with prior activities of tertiary student or non-employed/household person differed significantly from those whose prior activity was secondary student. Those who came to tertiary study from school had earnings higher than those other two groups. The interaction effect between different prior activity and support type was not statistically significant. This indicated that prior activity influences the earnings more than support type.

Figure 4.9: Fitted probability of earnings by support types and prior activity



Note: The effects shown are specific to the reference categories used for each control factor. The reference category refers to European males in the age group 15-20 years earning income zero income three years after completing a bachelors degree from a university as a full-time student, whose prior activity was secondary school student.

4.9 Effect of fields of study, EFTS usage and industry and support type on earnings

In addition to the above independent factors, the effect of field of study, 'equivalent full time study' (EFTS) usage and industry of employment were analysed and studied. Independent of support type, field of study showed a statistically significant difference in the probability of earnings, compared with the reference category (agriculture and environmental studies). Industry of employment also showed a significant difference in earnings, compared with reference category (agriculture and related industries) independent of support type. However, neither of these variables showed a significant interaction effect with support type. EFTS usage did not influence the probability of earnings with or without the interaction effect with support types.

The interaction effect between support type and the interaction effects of qualification level by field of study, industry by field of study, qualification level by completion status were also included in the model because, these effects are known to be strong determinants of earnings (Nair, 2007).

4.10 Effect of post-study years

Salaries and wages vary over time. So including them in the model allows an examination of whether these factors influence an individual's earnings over time through the student support system. For comparison, the post-study earnings of individuals from different years are deflated using the Labour Cost Index (LCI) to convert them to 2005 dollar terms and included in the model. The effect of year on the earnings is significant, but the interaction of year and support type is not, suggesting that the year effect is independent of support types. Hence, the likelihood of earnings in different income bands being due to support type reflects the effect after removing post-study year effect by the model.

5 Discussion

Attaining a tertiary qualification is an important determinant of an individual's future employments and earning opportunities. A previous study on the impact of support types on educational achievement (Nair, 2008) suggested that student support system contributes to improved academic achievement. Therefore, the student support system contributes indirectly to human capital accumulation through improved academic achievement, leading to better employment outcomes.

Given that the student support system influences academic achievement, this report extends the scope of the previous study by focussing on how the support system was associated with labour market outcomes. Looking at the effects of student support system on post-study labour market outcomes, this study suggested that student support types do not influence the labour market earnings directly. However, there is a marginally higher earnings probability linked to the 'loans only' support type, compared with the reference category of 'allowances only'. The apparent differences in earnings probability may be attributable to the absence of important factors like work experience and occupation, and attitudinal/motivational factors which have a strong bearing on earnings.

Age is treated in the model as a proxy for experience. Although the modelling controlled for age, the confounding effect of age and support types would have masked the actual effect of student support type on earnings. For example, the descriptive statistics revealed that for individuals under the age of 25 years, 36 percent of the allowances recipients studied for bachelors qualifications or above, compared with 28 percent for the 'loans only' support type. This implies that individuals from the 'allowances only' group are younger than 'loans only' people especially at the bachelors or higher qualification level. This means that the younger individuals from 'allowances only' earn less than those in the 'loans only' type, who are older. If we had been able to control for actual work experience, the earnings differentials between support types would have been non-significant.

From a psychological perspective, the recipients of different student support types may have different motivations that will have an impact on their career decisions. For example, it could be argued that a 'loans only' graduate is likely to have more incentives to actively seek promotion or salary increases in order to repay their student loan (which is likely to be larger than for the other groups) or perhaps they may be more likely to seek a return on their investment in tertiary education commensurate with their investment. Hence, it would be worthwhile to take up a future study of attitudinal aspects that are associated with different support types and how they affect future earnings potential.

In this report we compared the earnings among three groups with different student support

characteristics. We were unable to access earnings information of those who neither borrowed through the loan scheme nor took allowances, so those students were excluded from the model. This raises a question 'what if the data on 'no loans and no allowances' category were to be added to the analysis? We presume that the result would not have been different, had the 'no loans and no allowances' data been added to the analysis. For example, as the current result showed, earnings are partly explained by the successful completion of a qualification. Since the 'no loan no allowances' category showed lower completion rate than those receiving student support (Nair, 2008), we could argue that those who receive student support are more likely to earn in the higher income bands compared with the former category. This means the result would focus more on classifying the data into two broad categories — with and without student support.

5.1 Interaction effect of explanatory variables with support types

To examine whether the influence of student support type is modified in the presence of predictor variables, we used the interactions between support types and predictor variables. All the interaction between different predictor variables and support types showed statistically significant effect as per the Type III statistics. However, a closer look into the interaction between levels within each predictor variable and different types of support revealed that not all the effects are statistically significant.

For example, to examine whether the support types influenced the earnings probability in the presence of ethnicity, we tested the interaction between support types and ethnicity. We found that only the interaction between 'Other' ethnic group and 'loans only' type is found statistically significant. To examine whether and how different support types influenced earnings within each qualification level, we tested the interaction between support types and different qualification levels and found that only the interaction between level 8-10 postgraduate and 'Loans only' is significant. Similarly, test for the interaction between support types and completion status showed that only the interaction between 'Loans only' and completed qualification is significant.

Interaction of completion status by support type was the only important interaction effect observed in this study. The expected earnings for individuals who have successfully completed a qualification are more than for non-completers within each support types. Following Hyatt and Smyth (2006) and Hyatt et al. (2005), it is concluded that completion of a qualification has the greatest influence on income. Subsequently, Nair (2008) found that completion of a qualification is influenced by student support type as well as personal, study related and institutional factors.

In summary the interactions effect result suggest that, although the student support system does not influence the individual earnings directly, it does have an indirect effect through the academic achievement.

Conclusions

This report studied the impact of student support system on the earnings probability of individuals three and five years after leaving tertiary study, whether or not the individual successfully completed their qualification. The study used the integrated Student Loans Borrowers dataset to analyse the effects of different student support types on labour market outcomes. This study complements an earlier report focussed on the impact of the student support system on educational achievement. When studying the impact of the student support system, it is important to focus on different aspects of educational and life opportunities, which include post-study employment outcomes.

The relationship between the student support type and individual earnings is affected by study, institutional and employment characteristics. Ten factors representing these characteristics were used in the study as control variables. For this study, the probability of earnings of 'allowances only' category was compared with the outcomes of two other groups — 'loans only', and 'both loans and allowances'.

The key study findings showed that, looking at the effect of student support system on post-study labour market outcomes:

- Student support type does not directly influence labour market earnings. A marginal increase in earnings probability is found in 'loans only' type compared with the reference category of 'allowances only'.
- The apparent differences in earnings probability between the 'allowances only' and 'loans only' support types may be attributable to the absence of important factors like work experience, occupation and different motivational factors. The data suggested that individuals from the 'allowances only' are younger than 'loans only' type, especially at the bachelors and higher qualification levels.
- Interaction of completion status by support type is the only important interaction effect observed to impact earnings significantly. The likelihood of earnings for individuals who have successfully completed a qualification receiving any type of support types is more than non-completers within each support types. This result supports the hypothesis that the student support system influences the successful completion of a qualification, and this in turn influences the earnings.

In summary, this study suggested that, although student support system does not directly influence the post-study earnings, it has an indirect effect on individual earnings.

6 References

Hyatt, J. and Smyth, R. (2006) *How do graduates' earnings change over time?* Wellington: Ministry of Education.

Hyatt, J. Gini, P. and Smyth, R. (2005) *Income of student loan scheme borrowers*, Wellington: Ministry of Education.

Nair, B. (2006) *What factors impact on graduates' earnings three year post-study*, Wellington: Ministry of Education.

Nair, B. (2007) *Measuring the returns on investment in tertiary education three and five years after study*, Wellington: Ministry of Education.

Nair, B. Smart, W and Smyth, R. (2007) How does investment in tertiary education improve outcomes for New Zealanders? *Social Policy J. of New Zealand*, Issue 31: July 2007.

Nair, B. (2008) *Educational achievements of student support recipients*, Wellington: Ministry of Education.

Peng, C.Y.J., So, T.S.H., Stage, F.K. and St. John, E.P. (2002) The use and interpretation of logistic regression in higher education journals: 1988-1999. *Research in Higher Education*, 43(3):259-293.

Appendix 1

Cumulative logit model

We are interested in building up a model to describe the relationship between the response variable earnings and some of the explanatory variables, such as the age, level of education and ethnicity etc. Let's consider the probabilities:

$\theta_1 = \pi_1$, probability of Loans and Allowances,

$\theta_2 = \pi_1 + \pi_2$, probability of Loans and Allowances or Loans only,

where

π_1 = probability of Loans and Allowances,

π_2 = probability of 'Loans Only',

π_3 = probability of 'Allowances Only',

Then we can construct the cumulative logits:

$$\text{logit}(\theta_1) = \log(\theta_1/(1 - \theta_1)) = \log(\pi_1/(\pi_2 + \pi_3)),$$

$$\text{logit}(\theta_2) = \log(\theta_2/(1 - \theta_2)) = \log((\pi_1 + \pi_2)/\pi_3).$$

The proportional odds model (or cumulative logit model) is the following:

$$\text{logit}(\theta_i) = \alpha_i + \chi\beta.$$

Thus we allow the intercept to be different for different cumulative logit functions, but the effect of the explanatory variables will be the same across different logit functions. That is, we allow different α 's for each of the cumulative odds, but only one set of β 's for all the cumulative odds. This is the proportionality assumption and we test whether this assumption hold good for the model. Although this is a model in terms of cumulative odds, we can always recover the probabilities of each response category as follows:

$$\pi_1 = \theta_1$$

$$\pi_2 = \theta_2 - \theta_1$$

$$\pi_3 = 1 - \theta_2.$$

Source: http://www.ats.ucla.edu/stat/sas/seminars/sas_logistic/logistic1.htm (accessed 1 July 2008)

Appendix 2

Table A2.1: Distribution of individuals engaged in full-time studies by student support type and completion status, in six income bands

Support types	Completion status	Zero	< \$20,000	\$20,001-\$40,000	\$40,001-\$60,000	\$60,001-\$80,000	> \$80,000	Total
Loans Only	Completed	3,884	11,248	14,013	8,596	1,684	758	40,183
Loans and Allowances		7,092	21,472	23,069	16,388	2,750	869	71,640
Allowances Only		512	2,053	2,800	2,284	459	132	8,240
	Total	11,488	34,773	39,882	27,268	4,893	1,759	120,063
Loans Only	Incomplete	4,872	10,704	12,935	3,876	639	226	33,252
Loans and Allowances		4,905	11,290	12,791	4,679	676	224	34,565
Allowances Only		372	1,144	1,455	726	151	56	3,904
	Total	10,149	23,138	27,181	9,281	1,466	506	71,721

Table A2.2: Distribution of individuals engaged in full-time studies by student support type and completion status, in six income bands

Variable	Interaction effects model		Main effects model	
	Estimate	StdErr	Estimate	StdErr
Intercept				
Zero	2.08	0.70**	2.89	0.078**
< \$20,000	-0.34	0.70	0.59	0.078
\$20,000-\$40,000	-2.30	0.70**	-1.37	0.078**
\$40,001-\$60,000	-4.44	0.70**	-3.44	0.078**
\$60,001-\$80,000	-5.88	0.70**	-4.83	0.080**
> \$80,000 (Ref)				
Support types				
Allowances only (Ref)				
Loan and allowances	1.02	0.73	-0.182	0.018**
Loans only	1.38	0.71*	-0.029	0.019
Gender				
Male (Ref)				
Female	-0.30	0.01**	-0.34	0.01**
Age				
15-19(Ref)				
20-24	1.26	0.70	0.26	0.067
25-29	1.46	0.70*	0.39	0.067*
30-34	1.74	0.70**	0.59	0.068**
35-39	2.09	0.70**	0.66	0.068**
40-44	1.79	0.70**	0.65	0.069**
45-49	1.72	0.70**	0.60	0.070**
> 50	1.35	0.70	0.15	0.069*
Ethnic group				
European (Ref)				
Asian	-0.41	0.06**	-0.40	0.02**
Maori	-0.17	0.07***	-0.11	0.01**
Other	-0.38	0.08**	-0.35	0.02**
Pasifika	-0.20	0.12	-0.08	0.02**
Unknown	0.11	0.18	0.08	0.06
Qualification level				
Level 1-3 Certificate	-0.58	0.09**	-0.91	0.015**
Level 4 Certificate	-0.59	0.18**	-0.75	0.022**
Level 5-7 Diploma	-0.29	0.09**	-0.55	0.015**
Level 7 Bachelor (Ref)				
Level 8-10 Postgraduate	0.72	0.12**	0.51	0.019**

Field of study				
Agriculture (Ref)				
Architecture an	-1.05	0.21**	0.03	0.03
Creative Arts	-1.65	0.17**	-0.44	0.03**
Education	-1.54	0.20**	1.03	0.03**
Engineering and	0.14	0.14	0.23	0.03**
Food, Hospitality	-1.07	0.56	-0.16	0.03**
Health	-1.42	0.20**	0.07	0.03*
Information Technology	-0.37	0.18*	0.15	0.03**
Management and finance	-0.68	0.13**	0.08	0.03**
Mixed Field Prog	-0.31	0.23	-0.34	0.03**
Natural and Physical sci.	-1.17	0.19**	-0.50	0.03**
Society and Culture	-1.12	0.13**	-0.31	0.03**
Efts usage	-0.06	0.01**	-0.03	0.01*
Completion status				
Incomplete (Ref)				
Complete	0.58	0.04**	0.40	0.01***
Provider types				
Universities (Ref)				
Colleges of Education	-0.05	0.11	-0.12	0.03**
Institutes of Te	-0.26	0.05**	-0.21	0.01**
OTEPs	-0.38	0.22	-0.11	0.04*
PTEs	-0.12	0.06	-0.25	0.02**
Wananga	-0.33	0.20	-0.39	0.03**
Prior activity				
Employed or self	0.04	0.06	-0.002	0.01
Non-employed or	-0.40	0.08**	-0.58	0.02**
Overseas	-0.19	0.10	-0.28	0.03**
Secondary student (Ref)				
Tertiary	-0.30	0.06**	-0.23	0.01**
Unknown	-0.07	0.10	-0.01	0.02
Industry				
Agriculture (Ref)				
Accommodation	-0.54	0.25*	0.15	0.04**
Construction	0.29	0.17	0.70	0.04**
Cultural & Recreation	0.07	0.21	0.20	0.04**
Education	-0.40	0.23	0.00	0.04
Finance and Insurance	1.73	0.26*	1.34	0.04***
Government & Defence	-1.56	0.12**	-1.26	0.03**
Health & Community services	-0.07	0.23	1.72	0.03**
Manufacturing	0.62	0.14**	0.89	0.03**
Mining, Electric	1.46	0.61**	1.91	0.10**
Personal and Oth	0.18	0.22	0.69	0.04**
Property and Bus	0.56	0.14**	0.75	0.03**
Retail trade	-0.11	0.17	0.38	0.03**
Telecommunication	0.76	0.42	1.16	0.05**
Transport and St	0.43	0.22*	0.92	0.04**
Unknown	0.46	0.11**	0.75	0.03**
Wholesaling	0.58	0.20**	0.85	0.04**
Post-study year				
Post -year (3) (Ref)				
Post -year (5)	0.29	0.01**	0.33	0.01**

** Significant at 1 percent level; * Significant at 5 percent level;

Because of space limitations, the interaction effects are not presented here but are available from the author upon request