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DISTRIBUTIONAL IMPACTS OF INTEREST FREE STUDENT LOANS

A thesis (90-point)

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Abstract

Prior to 2006, New Zealand charged one of the highest rates of interest on student loans in the world; however, in line with the Labour government's agenda to increase access to tertiary education, this was the year a blanket subsidy was applied to interest on all such loans. Literature theorising on the implications of introducing an interest-free arrangement of this nature suggests the policy is likely to exacerbate income inequality. This distributional effect is attributed to the consequent non-price rationing of scarce educational resources and, in the case of income-contingent repayments, the benefit is greater the wealthier the borrower.

Changes in inequality owing to New Zealand's education subsidy are examined from two aspects in this thesis. First, data from the New Zealand Income Survey (2002-2007), is analysed to determine the distributional effects on a subgroup of likely student loan holders relative to the total sample population. Propensity score and kernel matching techniques reveal that the subgroup of likely student loan holders have higher average incomes irrespective of the subsidy, which suggests the large subsidisation may in fact be an inefficient way to target income inequality.

Second, public opinion regarding inequality in New Zealand is evaluated using data from the International Social Science Survey (1999 & 2009). OLS and probit regression models both suggest citizens would prefer to live in a society with less inequality; although, individuals from 2009 were less likely than those surveyed a decade earlier to believe it is the Government's responsibility to intervene. This indicates a policy such as the blanket subsidy on student loan interest may not adhere to public opinion as a solution to mitigate inequality.

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CHAPTER 1

INTRODUCTION AND MOTIVATION

1.1 Introduction

The cost of tertiary education is shared between students and the New Zealand Government in order to facilitate participation, and exploit the private and public benefits of tertiary education (Wolfe, & Haveman, 2001). Private incentives to study include increasing human capital and obtaining higher permanent lifetime earnings, which lead to beneficial externalities of improved productivity, and various positive social outcomes including a lower prevalence of crime.

Optimal spending on tertiary education involves a public contribution, the size of which depends on the extent of the social gains from education as illustrated in fig. 1.1. Without government subsidisation a potential student would make their decision where marginal private benefit (MPB) equals marginal cost (MC), at a cost of P_1 and a quantity Q_1 . This point represents an under-investment since higher level learning would be unaffordable for many potential students and society would miss out on the beneficial spill over effects those graduates would generate.

The marginal social benefit curve (MSB) in fig. 1.1 represents the benefit to the individual as well as society. Where MSB intersects MC is the socially optimal point. Here education has a higher price, P_2 , and to incentivise consumption at the corresponding quantity, Q^* , the government provides a subsidy of S_1 . With this appropriate government subsidy individuals pay a reduced price P_3 and education resources can be allocated at the socially efficient level. However, the government could over-invest by providing a subsidy greater than S_1 , which would facilitate more education than what is justified by the return to society.

Figure 1.1 highlights the legitimate role for government intervention; and indeed, across the 70 countries that currently operate student loan schemes, most include an element of Government subsidisation, whereby students are not expected to repay the entire cost of their studies. It is, however, the methods and extent of such intervention which proves contentious (McPherson, 1991).

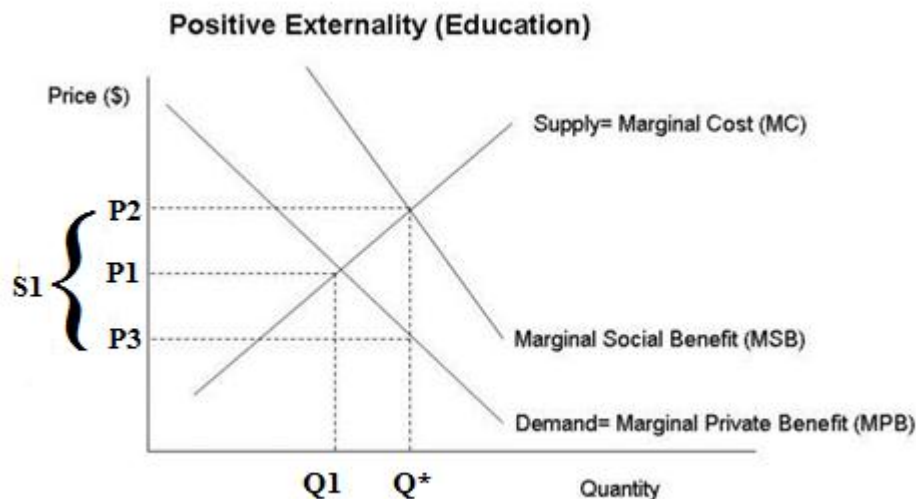


Fig. 1.1: Theoretical effect of an education subsidy.

One particularly popular method of government subsidisation initiated throughout student loan schemes worldwide is a ‘grace period’ (Woodhill, 1987). A grace period typically involves either the elimination of interest, or the elimination of repayment expectations for a specified period of time. This is often during study, or directly after, to allow graduates time to become financially stable. The extensive cost of implementing such a policy is justified by the contribution to greater equality (Levy, 2004).

The level of contribution from the New Zealand Government has changed dramatically over the past three decades. In the 1980s the New Zealand Government was providing almost full subsidisation to individuals participating in tertiary study. Often referred to as the ‘elite system’ this funding provided more or less free tertiary education, and universal student allowances (McLaughlin, 2003). The growing interest in tertiary education meant the government could no longer justify this type of funding. This was replaced with a flat rate fee charged to students in 1990 which further fuelled demand for tertiary education and led to

the development of the Student Loan Scheme in 1992 (McLaughlin, 2003). Student loans are a funding mechanism whereby the government pays tertiary tuition fees, deferring the individual's study costs until they are financially stable and can commence regular repayments. Originally, student loans bore interest at a market rate on completion of studies, with exclusions for borrowers facing particular hardships.

The Labour Party's surprising 2005 electoral promise to extend the interest¹ write-off to all student loans regardless of the borrower's employment status appeared to be driven solely by political objectives and was indeed cited as the promise that won the Labour party another term (Baxter, 2012). The Labour party expected the scheme to increase tertiary education participation rates, reduce inequality, and allow individuals to pay off their debt faster (Beehive, 2006). Yet, it is unclear if this is the case, for it is unlikely that the effects will be a straightforward extension of the during-study interest write-off. Research in this area is limited but initial theoretical investigation finds some evidence that such a policy may in fact be detrimental to inequality (Barr, 2009).

Theoretical analysis identifies two effects of a blanket subsidy that may result in a deepening of inequality (Barr, & Johnston, 2010). Firstly, the removal of financial barriers creates the need to ration scarce educational resources by non-monetary means. The use of an alternative mechanism, such as an academic requirement, is likely to disadvantage poorer potential students and worsen educational inequality since this group have lower academic outcomes. Secondly, the continuation of income-contingent repayments - where a set proportion of borrowers' incomes is deducted - means monthly repayments will be of the same value *ex ante* subsidy, but the duration of the loan is reduced. This reduction is dependent on income where higher earning graduates will be debt free faster, exacerbating inequality.

The high proportion of borrowers in New Zealand means these effects will be substantial, particularly as the proportion of borrowers has consistently increased since the introduction of this policy in early 2006 evident in fig. 1.2 (Education Counts, 2012c). With a higher number of borrowers the fiscal cost attributed to this subsidy is likely to increase. While it was very popular politically in 2005 it is unclear if the trade-off between equity and efficiency still adheres to public beliefs.

¹ This was based on the condition recipients chose to reside in New Zealand.

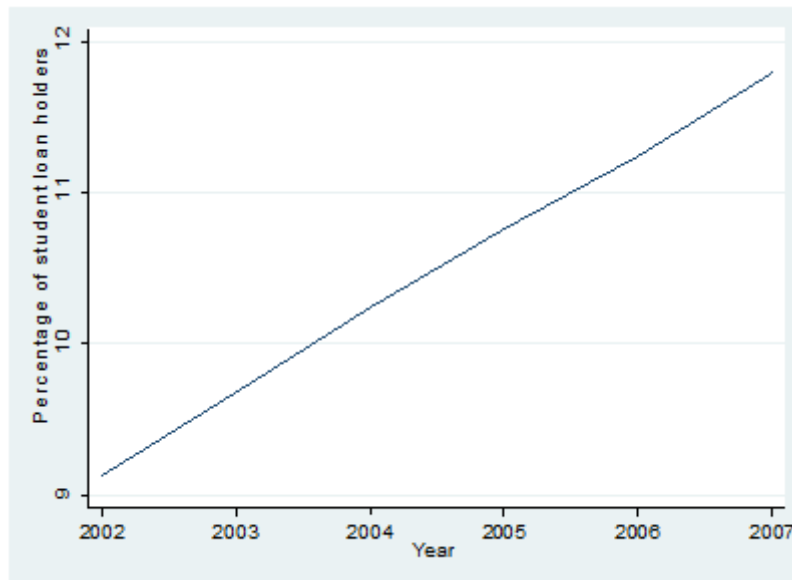


Fig. 1.2: Percentage of New Zealand population holding student loans from 2002-2007.

The implications for income inequality, from both non-price rationing, and extended loan duration for less well-off graduates, outlined in the literature thus far are solely founded on economic theory. In 2006 New Zealand became the first country to move from a high interest, to a no interest student loan scheme, providing a rare opportunity to investigate the outcome of such a policy change. Testing the distributional effects of New Zealand's radical policy change offers the first chance to reconcile theory with empirics and is the focus of this thesis.

1.2 Thesis Overview

This thesis proceeds as follows. Chapter 2 reviews the New Zealand Government's current and historic financial contribution to tertiary education. Participation rates in tertiary education, loan statistics - including uptake of student loans - and total amount borrowed are presented to provide context on tertiary education, and show how demand for funding schemes has developed over the past few decades. In addition, a case study is presented which outlines how particular policy changes have manifested across different types of borrowers.

Chapters 3 reviews the literature concerning the importance of funding tertiary education programs and the various subsidies introduced worldwide. Chapter 4

supports this by presenting the current student loan interest rates across multiple countries and the implications of these rates for repayment ratios.

Chapter 5 uses data from the New Zealand Income Survey (2002-2007) to empirically test the income and inequality outcomes of this policy on a group of likely student loan holders. A general picture of inequality will be presented and disaggregated subgroup effects will be presented alongside global effects.

Chapter 6 analyses changes in attitudes towards inequality using International Social Science Surveys from 1999 and 2009. Both OLS regressions and ordered probit results are used to identify if individuals in 2009 valued higher equality, a driver of the introduction of the blanket interest subsidy on student loans.

CHAPTER 2

THE NEW ZEALAND CONTEXT

2.1 Introduction

New Zealand's public expenditure on tertiary education against similar countries provides a context of tertiary education spending levels over the last decade. This is presented at the start of this chapter to set up how recent changes to the student loan scheme have likely impacted this spending. In addition a case study highlighting the potential magnitude of the decision to apply a blanket interest rate subsidy on all student loans in 2006 will conclude this chapter.

2.2 Public Expenditure on Tertiary Education

The extent to which the Government provides financial support to students has become particularly topical in New Zealand, as the country has seen the 4th highest increase in public expenditure in tertiary education across the OECD countries from 2000 to 2010. This translates to financial aid to tertiary students at a level of almost double that of the OECD average. This investment represents a significant trade-off at the expense of other policy areas, particularly in light of the fiscal stress caused by the global financial crisis (Treasury, 2012a; Vossensteyn, 2004).

Analysing public tertiary expenditure per student as a percentage of GDP per capita (Fig. 2.1) shows that New Zealand spent a larger percentage of GDP per capita on tertiary education per student than Australia, USA, and OECD countries from 1998 to 2010². In New Zealand this spending is inclusive of financial aid to students, and institutional funding. Financial aid to students includes student loans,

² (with the exception of OECD countries in 2006).

interest subsidies, allowances, and public subsidies including housing and medical expenses.

Looking specifically at the trends for New Zealand public spending on tertiary education was decreasing from 1999 to 2005. This trend was replaced with a significant increase in public tertiary spending from 2005-2010. A 25 percent increase occurred from 2005-2010, with an 8 percent and 10 percent increase occurring between 2006-2007 and 2008-2009, respectively. Both of these increases correspond with the introduction of the interest free student loan policy.

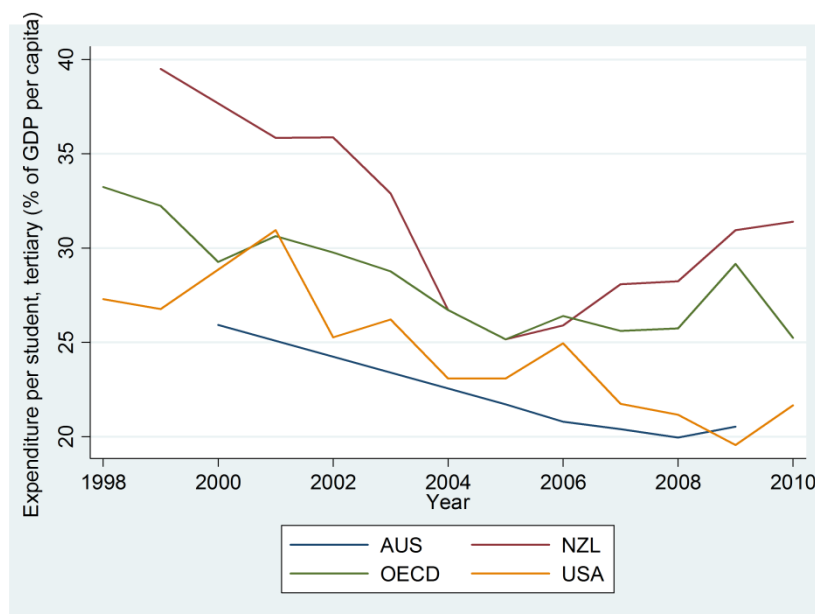


Fig. 2.1: Expenditure per student, tertiary (% of GDP per capita) 1998-2010 (The World Bank, 2014).

2.3 New Zealand's Student Loan Scheme

The New Zealand Government implemented widespread policy reforms in the 1980s in order to stimulate economic productivity and increase social equity. Increasing educational attainment was recognised as a means to achieve these goals, and the tertiary education sector was targeted as a catalyst. Increased participation in tertiary education in the 1980s created the need for mass tertiary education policies rather than the previously highly subsidised and targeted system that had much lower rates of participation.

The Ad Hoc Cabinet Committee on Education and Training was created in 1987. This committee produced a booklet for the New Zealand Government highlighting the benefits of higher participation in tertiary education. The issue of income support was raised due to the significant trade-off between mass participation and the high subsidisation of incomes which was currently in operation. This, coupled with a previous report from the Department of Education (1978), encouraged the Government to create the Working Group on Post Compulsory Education and Training (PCET) in 1988.

Recommendations from PCET and other departments led to the abolition of effectively free tertiary education, and universal student allowances in 1990. A system of user pays was introduced where a standard flat rate of fees was charged to students. A quasi-market for tertiary education was effectively created to promote economic competitiveness and increase the range of higher education providers. Increasing the number of higher education providers enables higher participation and effectively should act to reduce educational inequality.

However, the introduction of a flat rate fee to all tertiary education participants likely created a positional advantage for those from wealthier backgrounds, as wealthier families could afford to pay the flat rate fee. Therefore, although higher participation should act to reduce inequality the outcome of the introduction of the flat rate fee contradicts this. Thus, the prevailing impact on inequality becomes much more complex than theoretically predicted.

The removal of more or less free tertiary education and the introduction of a flat-rate fee created the need for some students to obtain financial support. While loans were available from the private sector, the absence of collateral for most students, and the increased risk of default associated with this type of borrowing created additional barriers. The National Government decided to develop and implement a loan scheme targeted solely at students in 1992. This scheme was introduced to provide loans to tertiary students in order to facilitate participation by all. It provided both tuition fees and education-related costs at more generous rates than that available from the private finance sector. Loans were income-contingent which meant no repayments were required until the recipients earned a sufficient level of income (\$12,670). The Student Loan Scheme was initiated and managed by the Ministry of Education.

Since its initiation, the Student Loan Scheme has undergone significant changes. The Ministry of Education recently published the key policy changes the student loan scheme has undergone during the period 1992-2012 and 15 major changes were listed. These included:

- In 1993 the academic requirement stating the recipient had to have passed at least half of their prior two years of tertiary study was abolished until 2011 when this was reintroduced.
- In 1997 the amount individuals could borrow for living costs was adjusted.
- 1999 saw numerous changes which included a change in how the payments were made, parental consent becoming mandatory for any borrower under the age of 18, and restrictions were placed on what borrowing could be used for (Education Counts, 2013b; New Zealand Parliament, 2013).
- In 2000 the first changes were made to the interest rates. A full blanket interest rate subsidy during-study was introduced. This blanket interest rate subsidy expired upon a borrowers exit from study and the standard interest rate of 7% was charged (Peterson, 1999).
- Following this in 2001 interest-setting mechanisms were established.
- In 2006 this interest blanket subsidy was extended to include all borrowers out of study who permanently reside in New Zealand. This is the focus of this research.
- A three-year repayment holiday where borrowers were exempt from all payment obligations was introduced in 2007 for overseas borrowers, however in 2012 this was reduced to only one year.
- In 2009 the living costs component of the loan became indexed to inflation and in 2011 a life-time borrowing limit was introduced (Education Counts, 2013a).

The latter changes to the student loan scheme are likely to be the most significant as the total number of borrowers and the total amount borrowed continues to increase (Fig. 2.2 & 2.3).

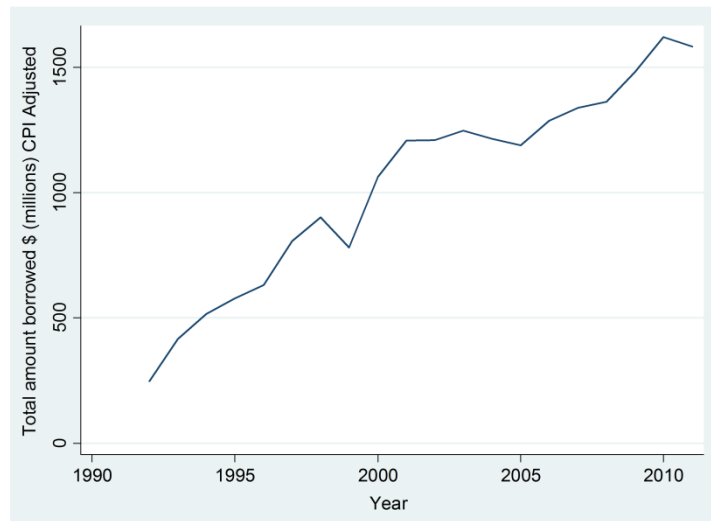


Fig. 2.2: Total loan borrowings by year (CPI adjusted³)

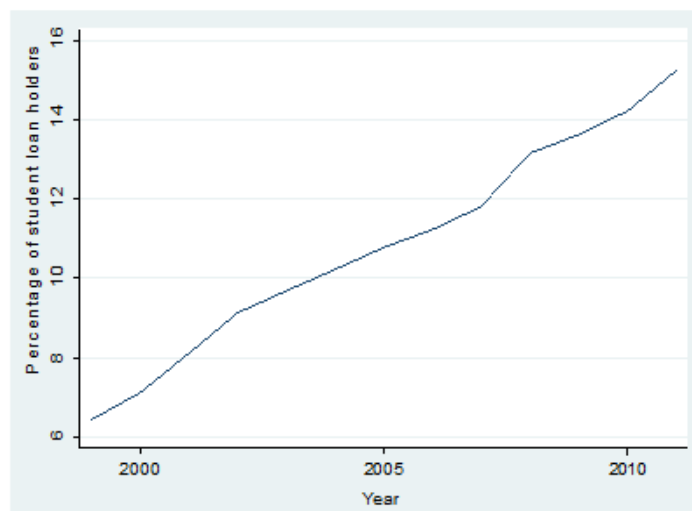


Fig. 2.3: Percentage of total student loan borrowers

2.4 Case Study

The Labour Government's decision in 2006 to remove interest from all student loans has largely reduced the debt burden of borrowers, and consequently reduced the length of repayments. How these effects occur can be shown empirically by considering an example of borrowers who took out loans in 1995.

³ Base year 2006 Q2

To calculate the average repayment time, it is assumed that all 42,735 new borrowers take out the average loan amount each year during study, study for average three years, make no repayments during this study period, then earn the average graduate salary each subsequent year meeting the minimum 10% repayment obligation only. (Education Counts, 2005). The average repayment period can then be calculated by determining the remaining loan value in each year:

$$L_{Y1} = L_1 * (1 + r) \quad (2.1)$$

$$L_{Y2} = [L_{Y1} + L_2] * (1 + r) \quad (2.2)$$

$$L_{Y3} = [L_{Y2} + L_3] * (1 + r) \quad (2.3)$$

Where: L_{Y1} = Value of student loan balance – year one

L_1 = Initial loan value

r = Student loan interest rate

L_{Y2} = Value of student loan balance – year two

L_2 = Value in year two

L_{Y3} = Value of student loan balance – year three

L_3 = Value in year three

After the first three years of study the remaining size of the loan each year can be calculated using:

$$L = [L_i - ((S - T) * .10)] * (1 + r) \quad (2.4)$$

Where: L = Value of student loan balance

L_i = Current loan value

S = Graduate salary

T = Repayment threshold

r = Student loan interest rate

Once $L = 0$ and the loan is no longer outstanding, the total repayment time can be calculated using the final year payments were made and the initial year the loan was withdrawn.

$$R = Y_f - Y_i \quad (2.5)$$

Where:

R = Repayment period

Y_f = Final year payments were made

Y_i = Initial year payments were made

Using these formulae, average repayment times can be calculated to compare expected loan lifetimes before, and after, the introduction of the interest free policy. Assuming the ex-ante interest rate of 7 percent per annum continued in the counterfactual instance, an average borrower in 1998 would repay their debt in just less than 14 years; whereas, having not accrued any interest post 2006, their loan would be repaid six months sooner as is outlined below.

Table 2.1

Repayment Time Comparison with Blanket Interest Subsidy

| | Interest | Interest-free |
|----------------------------------|-------------|---------------|
| Age | 22 | 22 |
| Total borrowers | 42,735 | 42,735 |
| Loan balance after 3 years study | \$17,063 | \$17,063 |
| Average graduate salary | \$27,194 | \$27,194 |
| Loan value after 5 years | \$14,032 | \$14,032 |
| Loan value after 10 years | \$6606 | \$5624 |
| Repayment time | 13.96 years | 13.43 years |

The removal of interest from 2006 resulted in the average borrower owing \$1084 less, which sums to almost \$55 million across all borrowers initiating loans in 1995. However, this is likely to be an over-estimate since the reduction in loan lifetime only holds when a graduate's earnings are above the repayment threshold.

The impact of this over-estimation can be examined by comparing the difference in loan duration between the student loan repayments made by a graduate who earns the average graduate salary, and a low earning graduate. Figure 2.4 shows the repayments schedule for the median loan value in 2008 (\$19,255) for an average graduate. The average age of students starting tertiary study is 22, and the average time spent in tertiary education is 3 years. After the three years within study, the average graduate starts on a salary of \$38,082 (Career NZ, 2012) and begins repayments of 12 cents (post 2012) in the dollar above the threshold of \$19,080. Using equations 2.1 and 2.2, the average graduate will start making repayments at the age of 25 and will finish paying off their student loan at the age

of 30 based on the aforementioned assumptions. As it can be seen in fig. 2.4 the total crown cost rises over the loan duration as interest accrues on their loan, and the student loan balance falls proportionate to the repayment increasing as the borrower makes regular repayments.

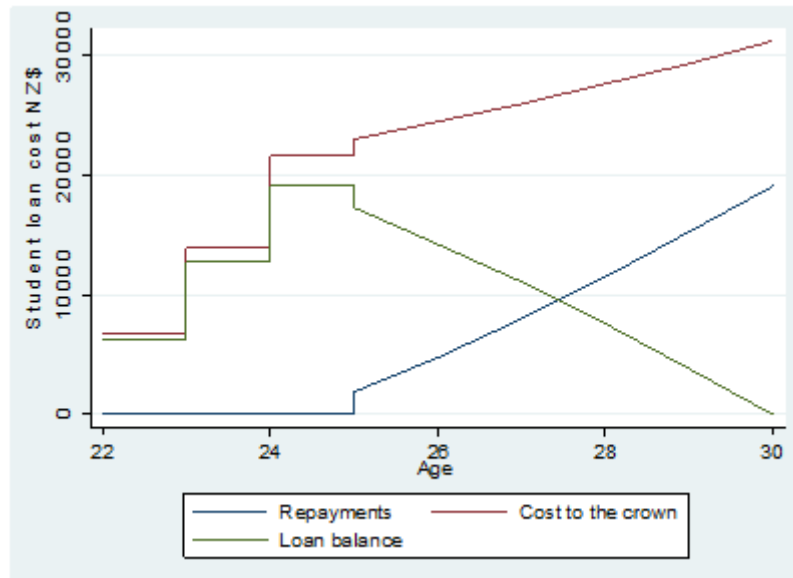


Fig. 2.4. Case study of an average graduate in 2012.

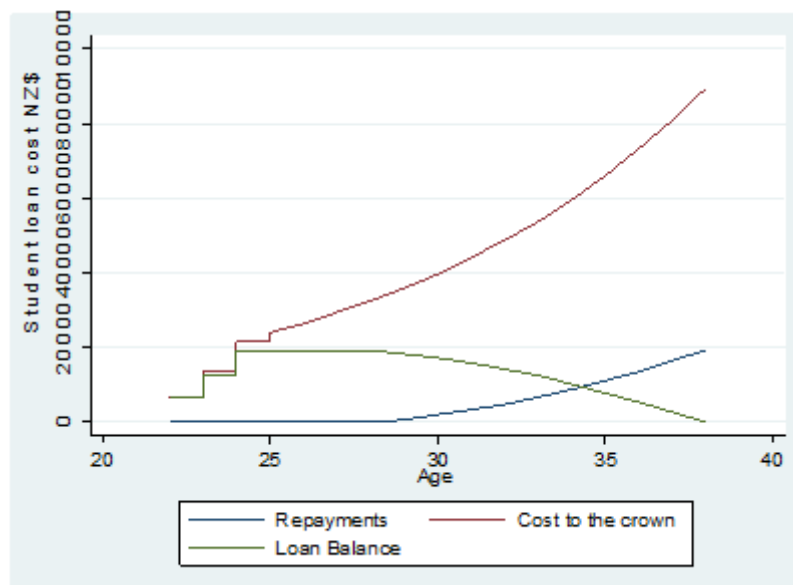


Fig. 2.5. Case study of a low earning graduate in 2012.

The projected case of a low earning graduate, presented in fig. 2.5, highlights the significance of a borrower's income in determining both the length of the loan and the cost to the crown. The main impact of non-repayment or low repayment is that the duration of the loan remains similar to the situation before the introduction of

the interest free policy. This increases inequality between the higher earning and lower earning graduates, since the latter carry the debt burden for a longer time.

Non-repayment due to a sufficiently low income occurred for approximately 50 percent of borrowers within the student loan scheme in 2006 for at least one year, while a further 26% of those borrowers made no repayments in the first three years post study. This is modelled in fig. 2.5 by the low earning graduate making no repayments until the age of 29 (Hyatt, Keenan, & Smyth, 2012). Assuming at the age of 29 this individual obtains a job with a salary of \$21,988, which represents the average salary for a hospitality graduate (Careers NZ, 2012), the forecast repayment time for this individual is 16 years.

These case studies highlight the significant role a graduate's income plays in determining the implications of the introduction of zero interest on student loans in 2006. Therefore, investigation into the distributional impacts of this policy using empirical data would highlight the extent to which these effects are occurring.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

In this chapter motivations for the adoption of a cost sharing approach between governments and individuals, facilitating participation in tertiary education are outlined. The theoretical implications of government funding in the form of a blanket interest subsidy will then be presented, and the particular implications of this subsidy occurring within an income-contingent based repayment framework. The responsiveness of student demand to price changes will add to the potential implications and magnitude of the blanket interest subsidy decision. Finally, the relationship between education and inequality will be presented. This is supplemented by results from New Zealand outlining the implications for inequality of past educational policy changes.

3.2 The Importance of Funding Higher Education

Investment in tertiary education is being seen as more and more of a necessity as the world shifts towards technologies which require workers who have a higher skill set (Ashton, 1996). Additionally, higher education facilitates the creation of human capital which increases labour market earnings and reduces unemployment. Higher human capital has also been linked to lower crime rates and health benefits which all contribute positively to economic growth and societal prosperity (Canton et al., 2001). This trend in public perception has pushed for governments to increase access to tertiary education in order for its citizens to compete globally (Goedegebuure, Santiago, Fitznor, Stensaker, & Van Der Steen, 2008).

One option available which can increase access to tertiary education is the subsidisation of educational funding. However, the funding of higher education is a complex and highly debated topic due to the high fiscal cost associated with funding schemes. This has created an impetus for Government to shift to market-based education policies which involves a higher private contribution to higher education, and the introduction of approaches based on cost-sharing. This is largely due to the unsustainability of free provision when there is higher participation, but also due to the higher private returns of tertiary qualifications and the regressive nature of free provision. Furthermore, it has been shown students are more likely to make better informed decisions if the financial burden ultimately falls on the individual (Vossensteyn, 2004). The existence of both private and public costs and benefits generates debate over how much of the cost should come from individuals versus how much should be borne by the Government.

The provision of educational funding by Governments is typically justified by two main objectives. Firstly, by offering a loan rather than a pay-out, and cost-share with borrowers, the cost to the government is greatly reduced. In addition, it also allows time for borrowers to become financially stable before initiating repayments. This reduces the debt burden for unemployed or low earning graduates and takes away the risk associated with withdrawing a loan. Secondly, by increasing participation by lower income groups this is likely to improve education equality.

In New Zealand, these objectives are communicated through the Tertiary Education Strategy (TES) which was established in 2002 and implemented by the Tertiary Education Commission (TEC) established in 2003. In the most recent TES (2010-2015) the main focus was to increase access to world-class skills for New Zealanders from all backgrounds, which is an explicit commitment to increasing equality of access. This would raise the skill level of the current and future work force in order to meet the labour demand and increase the knowledge base of New Zealanders.

Within the TES a cost-sharing approach was proposed which involves Government funding as a way to achieve these outcomes while being clear about the fiscal trade-off. This subsidisation should only equate to the marginal external

benefit received by the Government (fig. 1.1) and encourage participation at Q^* a point beyond where the free market would operate with no subsidisation. Policies are then implemented by the TEC and are required to have a report on the returns generated by the investment in the long-run. The table featured below specifies the private and social costs and benefits of participation in higher education. The ability to quantify some of the costs and benefits further adds to the complexity regarding the most efficient level of Government provision.

Table 3.1
The Private and Social Costs and Benefits of Higher Education

| | Private | Social |
|-----------------------|---|---|
| Costs | <ul style="list-style-type: none"> • Tuition, fees and study materials • Forgone earnings | <ul style="list-style-type: none"> • Operating costs of programs • Student support • Forgone national production related to students |
| Monetary Benefits | <ul style="list-style-type: none"> • Higher productivity and thus higher net earnings • Better job opportunities • Higher savings • Personal and professional mobility | <ul style="list-style-type: none"> • Higher national productivity • Higher tax revenues • Greater flexibility in labour force • Higher consumption • Less dependency on Government |
| Non-Monetary Benefits | <ul style="list-style-type: none"> • Educational enrichment • Better labour conditions • Higher personal status • Higher job satisfaction • Better health and life expectancies • Improved spending decisions • More hobbies and value of leisure activities • Personal development | <ul style="list-style-type: none"> • Social cohesion, appreciation of social diversity and cultural heritage • Higher social mobility • Lower crime rates • More donations and charity work • Increased capacity to adapt to new technologies • Higher social/political participation |

Source: Vossensteyn, 2004

3.3 Blanket Subsidy changes

The Government's contribution towards the cost-sharing approach to tertiary education dramatically changed when a blanket interest subsidy was introduced onto student loans in New Zealand in 2006. This was the first time a Government policy aimed at increasing access to tertiary education was not targeted at those solely with financial hardship. This surprising decision by the soon to be in power Labour party was very popular politically. However, the economic and social implications of blanket subsidies remain much less clear.

Limited research has been enacted in this area however, theoretical implications have been presented regarding the potential impacts. Professor Nicholas Barr of the LSE has specialised in research which looks at the possible effects of introducing a blanket subsidy specifically in the education market. Barr's (2012) findings do not debate that this type of policy will have a positive impact on educational access through lowering the barriers to entry, however, it is more likely this type of scheme will increase income inequality overall.

Two reasons are proposed for this increase in inequality. Firstly, universities becoming forced to ration scarce educational resources across more students when credit is not an obstacle, and thus, universities have to find a different discriminatory criterion. This creates an opportunity for universities to 'cherry pick' their students based on educational standards which has previously not occurred in New Zealand (Barr, 1989, 2002, 2003, 2009, 2012). This restriction coupled with new performance based measures of assessment makes 'cream skimming' or 'cherry picking' of students most likely to harm those from low-income backgrounds as it is widely believed that these individuals will have lower educational outcomes (Blanden & Gregg, 2004; Van Thiel, & Leeuw, 2002).

Secondly, the continuation of income-contingent repayments - where a set proportion of borrowers' incomes is deducted - means monthly repayments will be of the same value ex ante subsidy, but the duration of the loan is reduced. This reduction is dependent on income where higher earning graduates will be debt free faster, exacerbating inequality. Low earning or unemployed graduates will make no repayments and the length of their indebtedness will remain unchanged whilst their earnings are low, and widen the discrepancy in graduate incomes. Further, the clause forgiving borrowers of their debts upon death means the

repayment length of any consistently low earning, or unemployed, graduate will remain unchanged as they are likely to carry their student loan debt until death (Barr, 1989, 2002, 2003, 2009, 2012).

It is these potentially regressive impacts which make the additional cost experienced by the government unjustified. The offering of a lower rate of interest is effectively the same as handing out grants as governments never receive compensation

Barr's work shed light on some of the additional unintended consequences of blanket subsidies in the student loan market such as the additional cost experienced by the Government. In the UK it has been calculated that as much as 30-35 cents of every dollar borrowed is lost purely because of the current Government subsidisation in the student loan market⁴. This number is almost equivalent in New Zealand with the Treasury predicting a total loss of 45 cents in every dollar, of which 73% can be attributed to the interest free policy (Treasury, 2012b).

“One of the most expensive examples of unintended policy consequences in New Zealand’s modern history”

Professor Tim Hazledine (2013).

This cost can be shown empirically using an average borrower's loan in 2008 and the average discount rate of crown lending estimated as 6.26% (Parliament, 2012). This discount rate represents the full cost of lending and a risk adjusted value for the average loan balance across a borrower's repayment term with no repayments. Calculating the cost to the crown of offering an average borrower the median student loan amount in 2008 (\$19,255) with zero interest can then be calculated by:

$$C = L_i * (1 + d) \quad (3.1)$$

Where: C = Cost to the Crown

L_i = Initial loan size

d = Discount rate (6.26%)

⁴ Estimated by Barr using UK statistics

The discounted difference between the cost to the crown and the repayments made by the graduate represent the net present value of the student loan policy with zero interest accruing to the borrower. This area can be calculated using the net present value formula and then taking the difference:

$$NPV_{Govt\ cost} - NPV_{repayments} = NPV_{Total\ cost}$$

Where:

$$NPV = \sum_{t=1}^n \frac{R_t}{(1+d)^t} \quad (3.2)$$

Where: R_t = Net cash flow

d = Discount rate

t = Time of the cash flow

The net present value of an average borrower's loan withdrawn in 2008 and paid off in 2016 is \$72,706.83 using a 4% discount rate. This equates to a loss of 61 cent in every dollar lent. This differs from the prediction made by Treasury but both examples highlight a significant loss to the Government due to the interest free policy. However, this is as far as the literature extends in terms of direct before and after comparisons. Boston, Dalziel, and John (1999) point out that the gap between theoretical predictions of policy outcomes and empirical real world outcomes is not an issue restricted to the student loan policy area. They claim no New Zealand social policy initiative since the 1980s has been effectively evaluated post facto. This raises the importance of looking at the empirical effects of the introduction of policy, for example the impacts of the introduction of interest free student loans in 2006.

Although no specific study has linked educational outcomes and inequality impacts to the interest free policy decision, annual educational outcomes have been recorded by educational and external organisations. According to results produced by the OECD, (based on 2008 data) New Zealand has one of the highest participation rates for tertiary education on average. This is particularly interesting as this was one of the primary drivers the Labour government gave for making student loans interest free. Additional results from this report also list 'entry rate' indicators for New Zealand, where entry rate is defined as the first time an individual enters tertiary education. These indicators show New Zealand has a

large number of older students choosing to participate in tertiary studies with over half (68%) of all first entrants to tertiary study aged between 20 and 27 (Scott, & Gini, 2010). This is interesting as typically older students make better financial choices than their younger counterparts and may require less assistance (Davies, & Williams, 2001).

3.4 Income Contingent Loans

The theoretical impacts of interest free student loans are also dependent on how interest rates are manifested within the structure of the repayment scheme. There are two main types of student loans. Firstly, fixed schedule loans where an annual rate of interest is set, monthly payments are specified and there is a repayment period within which the individual must pay back the loan. Secondly, income contingent loans, where individuals are required to pay some proportion of future earnings at a fixed contractual rate of interest until the loan is paid or some predetermined time frame or amount has been reached. Australia was the first country to introduce an income contingent loan repayment scheme in 1989. New Zealand was the second country to adopt this type of scheme in 1992 and this was then followed by the UK, Sweden, Scotland and South Africa (Johnstone, 2005).

Chapman and Greenaway (2006) point out the advantages of income-contingent loans (ICL) which have implications for inequality. Firstly, it is likely a universal ICL scheme will decrease the possibility individuals will miss out due to unequal intra-family sharing compared with a mean-based tested scheme. This is because an individual's entry into the scheme is not restricted by parental willingness to help. Secondly, default rates should effectively be low if the repayments are collected through the tax system which reduces the financial burden on the Government. Finally, because they are based on the premise of the individual receiving a set amount of income, being unable to pay due to financial hardship should not be a problem. It is this last advantage that has particular implication for the uptake of loans by lower socio economic groups as it reduces the uncertainty associated with investment in higher education.

While the introduction of an ICL scheme has likely had a positive overall impact on equality it is because of this type of repayment scheme that the introduction of

interest free student loans in 2006 has likely had a regressive impact on equality. This is since Government subsidisation did not alter the amount of monthly repayments for the student loan holders simply the duration of the loan. This subsidy is therefore, only likely to help those financially well-off graduates who are able to repay their loans in a shorter timeframe. This does not help graduates while their incomes are low due to the confines of the repayment schedule. Additionally, any low earning or unemployed graduate is unlikely to afford the monthly repayments for example, in the 2009 tax year 52% of borrowers made no repayments and as such the duration of their loan remained unchanged (Ministry of Education, 2012).

3.5 Student Demand

Funding schemes are directly related to price i.e. if the price of tuition increases the amount of funding needed to cover this expense also increases. Therefore, expanding and equalizing the opportunity for individuals to undertake higher education is not only dependent on funding schemes but also largely dependent on manipulations of price. This is supported by economic theory which suggests that students demand for education will be responsive to prices changes. If the cost of education increases i.e. an increase in the fees this increases the cost of studying and the cost for some students will become too high, and this will lead those individuals to choose not to participate in study. Therefore, the introduction of the blanket subsidy in New Zealand, which reduces the cost of obtaining a loan to cover educational costs should, according to economic theory, result in higher enrolments. The magnitude of this effect is also dependent on the responsiveness of student demand to price. There has been significant research into estimating the responsiveness of student demand for education to variations in the price. The most common methodology involves estimating tuition elasticity using the income elasticity of demand.

$$|e_d| = \frac{\% \Delta \text{Enrollments}}{\% \Delta \text{Tuition Fees}} \quad (3.3)$$

No general consensus has been established in terms of an exact value for the elasticity of demand for education. However, in a comprehensive but dated review of 25 student demand studies the most common value of price elasticity of demand was found to be -0.24 (Leslie, & Brinkman, 1987). This result is particularly interesting as it suggests an inelastic relationship for example, an increase in price by 1% will only decrease the demand by 0.24%.

However, this study does not look at how the responsiveness differs across different socio-economic backgrounds (Leslie, & Brinkman, 1987). This factor alone has been shown to have a profound effect on the responsiveness of demand to price. In particular, students from a low income family, or who have uneducated parents have a much higher elasticity of demand towards higher education than those from higher income families. This is important as these traits have been defined as influential in the determination of enrolments (Bishop, 1977). The implications of discounting higher education by removing interest for all student loan holders is likely to be manifested within changes to low socio-economic group enrolments, where the responsiveness to demand is the highest.

3.6 Inequality and Education

New Zealand, along with many other developed nations, regards education as a way to reduce social inequality (Gregorio, & Lee, 2002). Higher education increases human capital and knowledge, which in turn creates higher returns to labour which affords the individual increased opportunities. Increasing access to higher education to all, therefore, increases the amount of people who can command a higher income and as such, should reduce inequality. This promotes social mobility and equalises opportunities across society (Bacchi, 2009). However, this assumes a world with no scarcity or necessary rationing of educational resources.

Psacharopoulos (1977) pointed out why free education, or in the case of the interest blanket subsidy, heavily discounted education, could in fact disadvantage those from lower socio economic backgrounds, and result in increased inequality. The rationale explains that free or discounted education must then be rationed by

an additional non-price mechanism and it is this mechanism that typically disadvantages those from lower socio-economic backgrounds. The academic requirement to enter university is one such example of a rationing mechanism. It has been shown that an individual's academic outcomes were one of the highest predictors of entrance into higher education (Strathdee, 2003). However, this is likely to negatively impact inequality as individuals from wealthier backgrounds have the means to support private preparation in order to ensure a place at a tertiary education provider, while those from lower socio economic backgrounds are more likely to miss out. Therefore even though lower socio-economic groups are more likely to have the highest demand response to changes in price this is under the assumption these individuals are not further restricted by rationing of educational places.

It must; be noted however, that both of these works were based on countries such as America and the UK where entrance exams to universities are compulsory and the reputation of the university plays a significant role in the returns to the human capital an individual receives. Owing to New Zealand's small population, places at the main universities are not quite as constrained, and there is a simple academic requirement based on school performance rather than an additional exam. Furthermore, results from a study undertaken by Strathdee (2011) indicated that it was not where one studied in New Zealand that made the major difference for future prospects, it was primarily the course of study chosen which influenced the opportunities available post-study. This suggests a gap in the literature exists where findings from New Zealand may provide valid insights to supplement theoretical predictions.

Psacharopoulo's (1977) research also showed that not only is indiscriminate subsidisation, such as the blanket subsidy on interest rates, likely to increase inequality it is also likely to be highly inefficient. This is because investment into tertiary education has the lowest rate of return when compared to primary and secondary due to the high private benefit associated with tertiary education. Therefore, while it would be more productive for Governments to increase investment in the primary or secondary sector it is becoming an ever increasing trend in society for Government's to fund higher educational opportunities (Psacharopoulos, 1977). This is evident in fig. 3.1 where New Zealand spends

almost double the expenditure on tertiary education than primary or early childhood education.

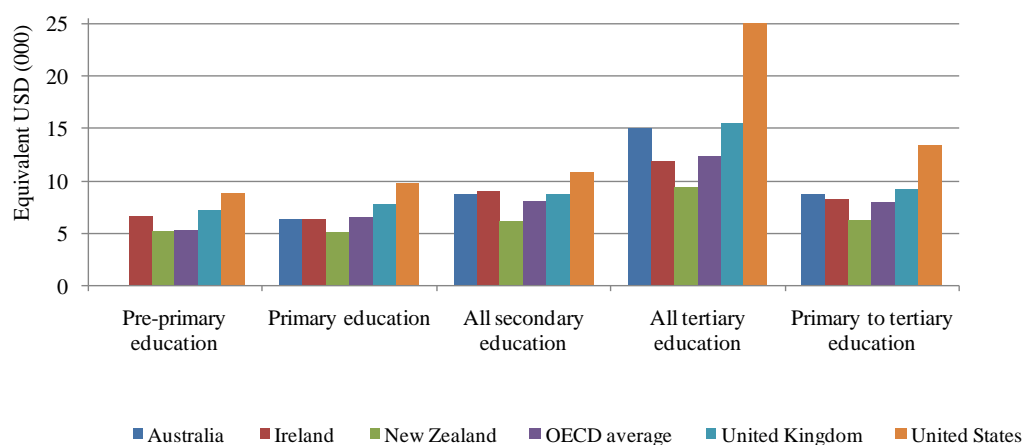


Fig. 3.1. Per student annual expenditure to educational institutions for selected OECD countries (2006). Source: Ministry of Education, 2009.

Therefore, efficiently targeting a reduction in inequality by increasing access to tertiary education is a complex objective if resources are scarce. Although education is widely accepted as a social equaliser where inequality can be reduced simply by increasing access to educational services and ensuring the quality of educational outcomes is high, this type of conclusion is devoid of the implications of scarce educational resources. Once the financial barriers are removed or decreased like that of the interest free student loan policy, demand for higher education increases, and educational facilities are forced to ration places. Educational institutions then become a type of oppressor towards lower socio-economic groups and this is likely to negatively impact inequality (Bacchi, 2009).

3.7 Results from New Zealand

New Zealand has undergone significant educational policy reforms since the 1980s and this provides an opportunity to identify how these previous reforms have impacted inequality and how these changes have been manifested. Research spanning from 1983 to 2001 in New Zealand revealed that individuals from a

middle class background were benefitting the most from the previous educational reforms, with the highest increase in participation in higher education. Richer individuals who were the most harmed by the reforms, (as previously this subset of the population were the most likely to be receiving the free tertiary subsidies), still had the highest rates of participation across all the groups, while poorer individuals participation remained relatively unchanged during this time. This result was particularly interesting as increased participation by poorer individuals was a key motivation for the reforms yet this may have been due to educational facilities rationing their places (Strathdee, 2003).

Following the 1990's reforms the Government formed both the TES and the TEC in 2002 as aforementioned. This led to the introduction of a number of policies aimed at reducing inequality. The introduction of the interest write-off for student during study in 2000 embodied this objective. Incomes of students during study are typically low, and by offering of an interest write-off to this group effectively provides a grant to lower income individuals which increases equality (Levy, 2004).

Interestingly, it was also the TEC who supported the Labour Government decision to extend this interest write-off in 2006 to all borrowers regardless of occupation. The primary justification for the introduction of this policy was to increase access to tertiary education, reduce inequality and allow individuals to pay off their debt faster (Beehive, 2006). While the interest-write off during study is attributed to positive equity gains, it is unclear if the extension of this policy to all borrowers regardless of occupation will have the same effect.

CHAPTER 4

STUDENT LOAN POLICY WORLDWIDE

4.1 Introduction

Student loans are one example of a market-type mechanism which facilitates participation in higher education. Student loans have been implemented in more than 70 countries around the world. Student loan mechanisms differ vastly among countries, however, the majority of student loan schemes offer funding towards either the cost to the institution, or other educationally-related expenses (Johnstone, 2009). This type of cost-sharing defers the payment for higher education until a future period when repayments are made (Johnstone, & Marcucci, 2009). This chapter provides a comparison of student loan interest rates worldwide and the subsequent implication of these interest rates for repayment ratios.

Typically student loans are provided by the Government due to a low financial incentive for private companies to put forth funds. This is primarily due to the high risk of default and absence of collateral by student loan borrowers. These considerable risks would lead to the free market interest rates on student loans becoming increasingly high without Government intervention (Johnstone, 2005).

Repayment of student loans is reliant on the type of loan structure and the associated interest rate. Although it is not uncommon for countries to charge a zero rate of interest, the decision made by the New Zealand Government to move from a real rate of interest (i.e. adjusted for inflation) of 6.9% to zero nominal rate was the first of its kind. Interest rates vary greatly across different countries and are listed below. Where possible, only loans which were most in line with New Zealand's Student Loan Scheme are listed rather than loans which were more

equivalent to the Student Allowance Scheme in New Zealand (The International Comparative Higher Education Finance and Accessibility Project, 2009).

Table 4.1
Student Loan Interest Rates Worldwide

| Country | Rate of interest |
|------------------------------|---|
| Australia | Zero real rate – indexed to the CPI |
| Brazil | Ranges between 3.5%-5.5% |
| Burkina Faso | 3% |
| Chile ⁵ | 2% |
| China ⁶ | Set by the People's Bank of China |
| Colombia | 1% |
| Denmark | 4% during study, then the discount rate of the Danish Central Bank plus an adjustment |
| England and Northern Ireland | 4.8% in line with Retail Price Index |
| Finland | Bank dependent interest rate 1.6% (2013) |
| France | Bank dependent interest rate typically 3.8-4.5% |
| Germany ⁷ | Zero nominal interest rate (negative real) |
| Hong Kong ⁸ | 3.6% set at no-loss-no-gain rate |
| Iceland | Up to 3% linked to CPI |
| Japan ⁹ | Variable upper bound 3% |
| Kenya | 4% |
| Lesotho | Zero nominal interest rate (negative real) |
| Malaysia | 3% |
| Mexico ¹⁰ | 7% |
| Namibia | 1-2% above inflation |
| The Netherlands | Tied to market rate, at 2.7% (2005) |

⁵ Chile has three different loan types

⁶ China has three different types of loans

⁷ Germany has two different types of loans

⁸ Hong Kong has two different types of loans

⁹ Japan has two different types of loans

¹⁰ Mexico has four different types of loans

| | |
|---------------------------------|--|
| Norway | Zero nominal interest rate (negative real) |
| Peru | 12.5% |
| Philippines | 6% |
| Poland | Half the discount rate of the National Bank of Poland 3.25% (2004-2005) |
| Portugal | Fixed interest rate equal to Euro interest rate swap plus a maximum spread of 1% |
| Rwanda | 5% |
| Republic of Korea ¹¹ | 6.6% of which Govt subsidises for poorer students |
| South Africa | Zero real rate – indexed to inflation |
| Sweden ¹² | Fixed annually at Govt rate minus 30% subsidy |
| Swaziland | 5% |
| Taiwan | 2.9% of which Govt subsidises for poorer students |
| Tanzania | Zero nominal interest rate (negative real) |
| Thailand | Zero real rate – indexed to inflation |
| Turkey | Zero real rate – indexed to inflation |
| USA ¹³ | Adjusted annually upper bound 8.25%, 6.8% (2009) |
| Wales | Rate of inflation in line with Retail Price Index |

¹¹ Republic of Korea has four different loan types

¹² Sweden has two different loan types

¹³ USA has four different loan types

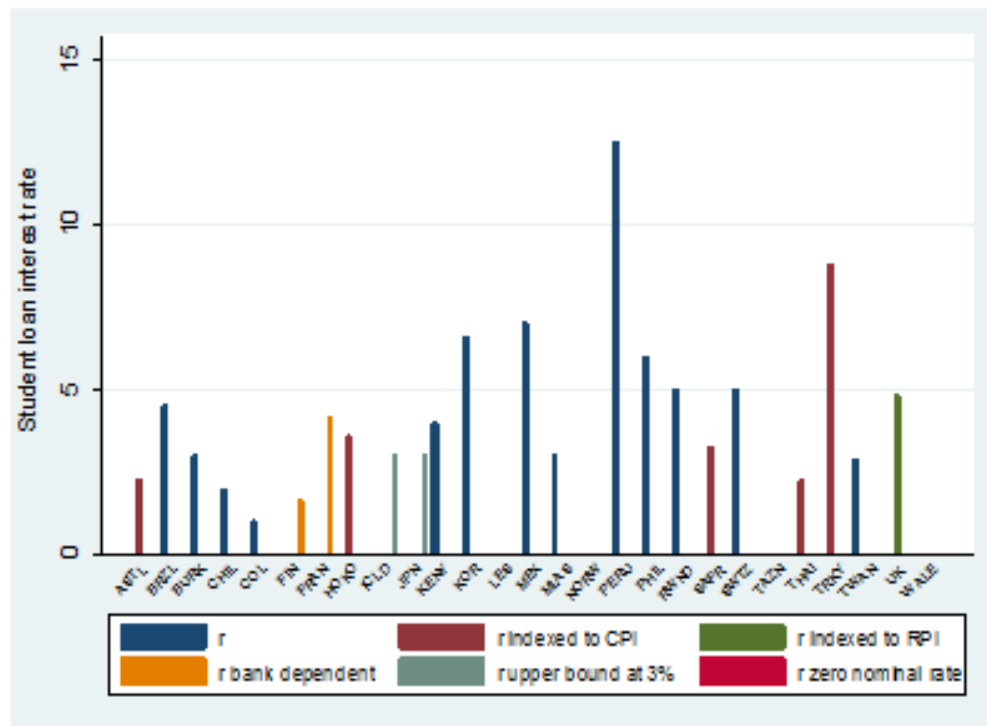


Fig. 4.1. *Country specific interest rates.*

In a study conducted by Shen and Ziderman (2009) recovery ratios of loans were analysed across numerous countries in order to identify common factors which lead to increased repayment or efficiency of the scheme. Interestingly, the interest rate charged to borrowers did not systematically influence the recovery ratio. Recovery ratio values for the Philippines and Kenya were 1.32% and 5.59% respectively which were the lowest among the countries included yet both countries charged mid-range interest rates of 6% and 4% respectively. USA has one of the highest rates of interest charged to their borrowers however, their recovery ratio was 75.63% and both Thailand and South Africa charge a zero real rate of inflation and had recovery ratios of 28.21% and 35.83% respectively (Shen, & Ziderman, 2009).

These results suggest the level of interest charged to borrowers does not have a significant effect on the likelihood of borrowers repaying their debt. This contradicts a previous study on global student debt patterns conducted by Usher (2005) where it was concluded that interest rates were crucial to repayment ratios.

Interestingly, this study also showed New Zealand had one of the worst repayment ratios, and Usher (2005) advocated New Zealand adopt a lower rate of interest, like that of European countries, to improve this (only months before the blanket subsidy was introduced). This is particularly relevant for New Zealand as one of the motivating factors of introducing a zero rate of interest was in order for borrowers to repay their debts faster. However, despite this argument being supported by Usher (2005) limited evidence was found by Shen and Ziderman (2009).

CHAPTER 5

TESTING THE DISTRIBUTIONAL IMPACTS

5.1 Introduction

The introduction of zero real interest on student loans for all borrowers in New Zealand in 2006 was a significant change in policy which has likely had effects on income inequality. The direction and magnitude of these effects is particularly interesting to investigate, as theoretical predictions regarding the direction of inequality post policy, contradict those put forward by the Labour party.

Previous theoretical research suggests the introduction of this type of blanket interest subsidy would result in a worsening of income inequality. This effect was justified by the negative implications of adopting non-price rationing of scarce educational resources and, the benefits of reduced loan durations with income-contingent repayments, accruing primarily to wealthier borrowers.

Testing the implications of adopting a non-price rationing based enrolment system would be optimal using data on enrolments. Identifying the characteristics of individuals who apply for university, but who were denied based on this system, would provide insight into the type of individuals this rationing was negatively impacting.

Investigating the impact of this policy within an income-contingent repayment scheme would be most appropriate on up-to-date longitudinal data. These data would include integrated student loan status, income, and expenditure. Income-contingent repayment schemes restrict the effect of this policy to the duration of the loan, rather than altering the monthly repayment amounts. Therefore, longitudinal data would be the most appropriate to analysis the effect of shorter

student loan repayment durations on income inequality using income data from individuals over time. Expenditure data would also be useful to examine if individuals are participating in income smoothing because of the policy change i.e. increasing their current expenditure because of the reduction in the length of debt repayment.

Enrolment data including the counterfactual situation for individuals who apply to university but are denied is hard to source. Additionally, longitudinal datasets are extremely costly to undertake, and as a result no such survey which incorporates student loan status, income and expenditure currently exists. Furthermore, access to current longitudinal datasets such as, the Survey of Family Income and Employment (SoFIE) which incorporate at least some of these elements is expensive.

This chapter does not endeavour to explicitly test each of the aforementioned theoretical predications given the data restrictions, rather, it provides a general overview of income inequality from 2002 to 2007, with econometric methods adopted to compensate where possible for the limitations in the dataset.

5.2 Data

In this section data from the New Zealand Income Survey (2002-2007) will be used, which are provided in the form of a Confidentialised Unit Record File (CURF). Statistics New Zealand runs this survey annually each June quarter as a supplement to the Household Labour Force Survey (HLFS). To avoid the identification of any one individual that may breach the Statistics Act 1975, extreme data values are top and bottom coded, rounded, and any household linkages removed. Full details of these procedures can be found on the Statistics New Zealand website (Statistics New Zealand, 2012a). This survey spans approximately 29,000 usual NZ residents which equates to approximately 15,000 private households. All respondents are aged 15 years and over, and reside in rural and urban areas across NZ. The New Zealand Income Survey collects both household and individual information pertaining to gross wages and salaries, self-employment, government transfers, and investment income.

One limitation of using CURF data is that the survey does not ask respondents whether or not they are a student loan holder. This restricts specific policy analysis in terms of the inequality effect resulting from the introduction of zero interest in 2006. In order to overcome this limitation, an unpublished study on student loan holders (Gibson, & Le, 2013) is used to identify characteristics of those likely to have a student loan (Appendix 5). Using imputing techniques a probability value is assigned to each individual in the NZIS which represents the likelihood of their being a student loan holder, and this probability is used to create a cumulative distribution function (Appendix 7). Applying the national representative proportion of student loan holders from 2002-2007 (Education Counts, 2013c) as a threshold value, any individual with a probability value which falls within this threshold will be used to form a subgroup of individuals who are most likely to be student loan holders. This subgroup will then be used to identify the changes to inequality across the sample time period. The total sample population will also be used to identify any significant changes to inequality in order to gain a general picture of inequality, and to disaggregate subgroup effects from any global effect.

The unpublished study identified likely factors which were significantly associated with individuals being a student loan holder. These included:

- Being female
- Maori or Pacific ethnic group
- Only the age range 25-45 was included, but being younger within this bracket was associated significantly with holding a student loan
- Undertaking a degree rather than vocational training or a diploma
- Living in the North Island or within the Canterbury region

Additionally, the Student Loan Annual Report (SLAR) provides demographic information on student loan holders. The SLAR confirmed the increase in borrowing evident by females. This report also stated that those aged under 27 represented 68% of all borrowers and this supports the lower portion of the age bracket 25-45 being significantly associated with holding a student loan. Over a third of borrowers were defined by the SLAR as identifying themselves as Maori or Pacific during the time period 1997-2011 which is relatively high considering their given population proportions and supports the findings of the previous study.

5.3 Measuring income

5.3.1 *Gross Income*

The detailed nature of the income data obtained in the NZIS enables multiple measures of gross income to be recorded. The income variable which includes all sources is defined by “Incomes received before tax from all sources such as wages, salary, self-employment, Government transfers, private superannuation and pension schemes and annuities” (Statistics New Zealand, 2002, p.42). These data are collected based on weekly values excluding self-employment where annual figures are recorded and this is divided to give weekly estimates.

Research has shown that permanent income is a much better source of data to analyse inequality than current income, as a typical risk adverse individual will use their current income to smooth consumption. That is to say in a period of low income the household may use previous savings or borrow using credit in anticipation of higher future earnings. Obtaining permanent income values requires longitudinal studies which limits the applicability of obtaining this type of data. However, the NZIS collects both current weekly earnings from all sources and usual weekly earnings. Therefore, to approximate permanent income, usual weekly income values from all sources have been annualised.

5.3.2 *Disposable Income*

In order to obtain an income value relevant to a proxy for individual decision making, an approach undertaken by Stillman, Le, Gibson, Hyslop, and Mare (2012) was applied. This involved applying tax rates and ACC levies to annual income values¹⁴(Inland Revenue, 2013). Interestingly, based on economic theory the introduction of the blanket subsidy in 2006 for all student loan holders choosing to reside in New Zealand should in fact have had little impact on disposable income due to income contingent repayments.

The reduction in the length of repayments due to the blanket interest rate subsidy does however, allow a group of individuals to pay back their loans earlier in 2007 when compared with the counterfactual situation if interest was still accruing on

¹⁴ This excludes a range of complicated tax measures.

student loans. Disposable income values for this particular group from 2006 to 2007 should increase due to the elimination of their student debt. The magnitude of this effect is largely dependent on the number of borrowers in this situation and can be calculated using the following assumptions:

- Student loan borrowers borrow the median loan balance (Education Counts, 2012)
- Borrowers upon finishing study (3 years on average) earn the average graduate salary which increases over time according to the average graduate career progression path (Careers NZ, 2012)
- Borrowers only make the obligated repayments (10%)

Applying these assumptions and using equations 2.1 and 2.2, revealed only borrowers who started studying in 1998, studied for three years, and started an average graduate job in 2001 are affected by this. The number of new borrowers in 1998 was 46,884 which represents 9% of the total student loan borrowers in 2007. Therefore, 9% of the subgroup of likely student loan holders will have higher disposable incomes in 2007 attributed to the removal of interest from student loans.

5.3.3 Lifetime Income

In an attempt to eliminate the effects of the subgroup of likely student loan holders having higher inequality simply due to their age, propensity score matching techniques will be used to match individuals in the subgroup with similar, but older counterparts. This technique will give a counterfactual measure of income which can be used to identify potential age effects.

5.3.4 Standardised Income

In addition to applying tax rates to gross income values these values will also be adjusted by average prices. This allows comparison across years in terms of the purchasing power of their income. The CPI ¹⁵ reported by Statistics New Zealand will be used to adjust the values from quarter two, as this quarter corresponds with the collection timing of the survey.

¹⁵ Base year 2006Q2

5.4 Methods

Multiple methods of calculating inequality will be presented to ensure limited bias results from using one specific approach. Each approach carries with it an implicit or explicit judgement on the importance of changes in inequality towards different areas of the income distribution. Firstly, the Gini coefficient will be presented which shows how the equalized distribution of incomes in the sample deviates from the perfectly equal distribution. This is calculated by the weighted sum of the individual's income. The weight is implicitly determined solely by the rank-order of the individual's income in the distribution as shown below.

$$G = 1 + \frac{1}{n} - \frac{2}{n^2\mu} (y^1 + 2y^2 + 3y^3 + \dots + ny^n) \quad (5.1)$$

$$\text{For } y^1 \geq y^2 \geq y^3 \geq \dots y^n$$

Where, n = sample size
 y = income
 μ = mean

Following this the p90/p10 ratio will be presented which involves comparing those in the top 90th percentile of the income distribution as a ratio to those who were placed in the 10th percentile based on earnings. Finally, the Atkinson values will be calculated which gives the proportion of total income which would be required in order for the level of social welfare to be equal if incomes were all perfectly distributed. This is calculated as the proportional difference between the sample mean and the equally distributed equivalent level of income.

$$A = \frac{\bar{y} - y_e}{\bar{y}} \quad (5.2)$$

Where, \bar{y} = mean value of y
 y_e = equally distributed equivalent level of income

The equally distributed equivalent level of income (y_e) is the level of income which, if everyone in the distribution received it, would produce the same social welfare as the actual distribution. This parameter is calculated by:

$$y_e = \left(\frac{1}{N} \sum_{i=1}^N y_i^{1-\varepsilon} \right)^{\frac{1}{(1-\varepsilon)}} \quad \varepsilon \neq 1 \quad (5.3)$$

Where, N = sample size

y_i = income of the i th individual

ε = inequality aversion parameter

The epsilon value is a sensitivity parameter which allows greater weighting to be placed on poorer individuals¹⁶. This parameter reflects the tolerance of loss in terms of transfers from richer to poorer individuals (Creedy, & Sleeman, 2006). Creedy and Sleeman (2006) showed that the different values of ε all produced reductions in the Atkinson value, however the magnitude of the reduction varied greatly. A value of one will be used in subsequent analysis and represents substantial aversion to loss (Jenkins, 1991). This simplifies equation 5.3 to the following:

$$y_e = \left(\frac{1}{N} \sum_{i=1}^N y_i \right) \quad (5.4)$$

Each inequality measure has advantages and disadvantages which this section will briefly outline; for a comprehensive comparison see Atkinson (1970), Litchfield (1999) and De Maio (2007). Using the Gini coefficient as a measure of inequality holds the advantage that it is the most widely used and understood measure of income inequality and this enables easier global comparisons. In addition, the Gini coefficient measure enables direct comparison of two populations regardless of their independent size. However, using the Gini coefficient measure makes the inequality estimates most sensitive to the mode of the distribution which can be a disadvantage particularly if specific areas of the distribution are of interest. Further, the same inequality estimate can occur from several different distributions which can become an issue if the structure of the income distribution is of interest.

A key advantage of using the Atkinson measure of inequality is the inclusion of a sensitivity parameter which can place a greater importance to a subgroup of

¹⁶ $\varepsilon = 0$ is only concerned with total income and not how this income is disbursed compared with $\varepsilon = \infty$ which is only concerned with the income of the poorest individual and is very bottom-sensitive.

individuals within the sample which can highlight particular inequality changes for this group. This is an advantage as the researcher is able to place an explicit value judgement on what they consider to be the most important area of the income distribution. This advantage can also become a disadvantage as the infinite possible values of ϵ can make comparisons limited. Finally, using decile ratios such as the p90/p10 offers a simple and easily understandable way to analysis inequality across specific population groups. One key disadvantage of using this type of measure is the inability to identify transfer sensitivity. For example, if money is transferred from a rich person to a poor person both the Gini coefficient and the Atkinson measures will show a more equal distribution, however the p90/p10 ratio does not identify this transfer sensitivity.

All three measures will be presented in order to take advantage of their individual strengths while trying to limit the different disadvantages of each approach. In addition Kernel Density functions and Lorenz Curves will also be calculated which enables the exact changes of inequality to be visualised along the income distribution.

5.5 Weights

An additional limitation of the CURF data is the complex sampling method and multi-staged design under which the surveys are collected. To overcome any bias that may have arisen due to the use of clustered sampling, the CURF data provides replicate weights which are calculated using Kott's (2001) delete-a-group Jackknife procedures. Thus, weighted statistics will be calculated to avoid biased coefficients and standard errors. These weights are provided by Statistics New Zealand to allow each person in the sample to represent a number of people in the total population with similar characteristics.

5.6 Subgroup

Using the aforementioned characteristics and imputing techniques, a subgroup of the population will be used to identify any inequality changes experienced by those most likely to be a student loan holder. Each individual was assigned a probability value which represented the likelihood of them being a student loan holder. These probabilities were then graphed on a cumulative distribution function (Appendix 5) and a threshold value was assigned which represented the

percentage of the total New Zealand population who had a student loan in each respective year (Appendix 6). Any individual with a probability value above the threshold was used to represent the subgroup of the sample population who were most likely to be holders of a student loan.

The negative coefficient on the age variable (Appendix 5) suggests those of a younger age had a higher probability of being a student loan holder. This is likely to impact inequality figures, and density functions as individuals who are younger are also more likely to have a lower income due a positive relationship between age and income until retirement (Deaton, 2005). To overcome this potential limitation, propensity score matching techniques will be used. This involves matching those within the subgroup to those aged 35-55, and subsequently those aged 45-65 who exhibit similar characteristics. This allows the comparison of weekly income values to examine if age mitigates the effect of younger student loan holders receiving less income. If this is the case then providing a subsidy to these individuals may be unnecessary as they are already likely to earn more over time.

Let Y_{i0} and Y_{i1} be weekly usual earnings for any two counterfactual individuals in the sample population, where $T = 1$ represents individuals in the pre-determined subgroup who are most likely to be student loan holders, and $T = 0$ represents individuals aged 35-55 in the sample population whom are not in the subgroup. Creation of a propensity score using a probit equation based on a set of observable characteristics X_i gives a propensity score $P(X_i)$ which can be defined as $P(X_i) \equiv P(T_i = 1|X_i)$ where the propensity score is the conditional probability of being a student loan holder.

Using this propensity score, kernel matching techniques will be implemented to match those individuals in the sub-sample with their most similar older counterfactual. This allows the average treatment effect to be estimated which is defined as,

$$\begin{aligned}\tau &= E\{E\{\Delta_i|T_i = 1, P(X_i)\}|T_i = 1\} \\ &= E\{E\{Y_{1i}(1)|T_i = 1, P(X_i)\} - E\{Y_{0i}(0)|T_i = 0, P(X_i)\}|T_i = 1\} \quad (5.5)\end{aligned}$$

where the expected gain in weekly usual income for those who are most likely to be a student loan holder is compared with what their older counterfactuals currently earn.

Rosenbaum and Rubin (1983) introduced three conditions that the average treatment effect relies on; ‘unconfoundedness’, ‘common support’, and ‘balancing’. ‘Unconfoundedness’ refers to the assumption of conditional independence where given a set of observable covariates X_i assignment to treatment is random i.e.

$$Y_{1i}(1), Y_{0i}(0) \perp T | P(X_i)$$

Therefore, any comparative differences that arise between the treated and the non-treated group should arise solely due to the effects of the treatment. ‘Common support’ is the notion that in a sufficiently large sample of observations for each X_i , a Y_{0i} and a Y_{1i} will be observed. The continuous nature of propensity scores supports applying a ‘kernel matching’ procedure where each treated individual Y_{1i} is assigned with a weighted average of non-treated individuals Y_{0i} rather than simply matching two observations. This weight is inversely proportional to the distance between propensity scores of treated and non-treated individuals which differs from nearest neighbour matching techniques. Nearest neighbour methods differ from kernel matching as each treated individual is matched with their nearest matching non-treated counterpart. Both measures will be calculated and given in appendix X. Finally, balancing tests will be used to ensure mean independence between the covariates and the treatment after the propensity score weighting.

Three sets of matching covariates were used to predict the likelihood of being a student loan holder. These included the individual’s ethnicity, gender, and qualification. The choice of only a few parameters was made as although over-parameterised models are unlikely to bias the model or make the estimates inconsistent they are likely to increase the variance.

5.6.1 Sample versus total population

Inferring economic behaviour from sample data is always likely to raise credibility issues. In order to overcome this limitation bootstrapping techniques and weights have been applied as aforementioned. However, in addition to this descriptive statistics can be utilised to ensure the subgroup is also representative.

Statistics reporting the percentage of the New Zealand population who hold a degree or higher and who are aged 25-64 has steadily increased from 2002-2007 which corresponds with the pattern observed in the NZIS collected. However, comparing the statistics from the table below show that the NZIS population aged 25-45 has a larger proportion of degree holders compared with the total population. Interestingly, the magnitude of the changes between years is relatively similar across both samples, with a very small or negligible increase from 2005-2006.

Table 5.1

Comparison of degree rates among NZ population and Sample population

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--------------|-------|-------|-------|-------|-------|-------|
| NZ Pop % | 14.4% | 15.6% | 16.9% | 19.4% | 19.7% | 22.5% |
| Sample Pop % | 16.2% | 17.9% | 20.4% | 23.3% | 23.3% | 26.1% |

Data Source: Education Counts, 2013c

Descriptive statistics are presented in table 5.2 for the subgroup of likely student loan holders from 2002-2007. The smallest subgroup occurs in 2002 with only 332 individuals while the largest subgroup occurs in 2007 with 1075 individuals. Interestingly, the proportion of the subgroup that held a degree in 2007 was the lowest across the timeframe which does not correspond with the national trend.

Table 5.2

Subgroup descriptive statistics

| Subgroup | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Age 18-34 | 26.48 [0.14] | 26.97 [0.09] | 26.4 [0.05] | 26.42 [0.06] | 26.44 [0.06] | 28.68 [0.16] |
| Age 35-54 | 39.81 [0.47] | 40.08 [0.29] | 0 0 | 0 0 | 0 0 | 40.3 [0.17] |
| Age 55-64 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 | 0 0 |
| Female | 0.67 [0.03] | 0.64 [0.02] | 0.72 [0.02] | 0.71 [0.02] | 0.72 [0.02] | 0.60 [0.02] |
| Maori and Pacific Island | 0.31 [0.03] | 0.2 [0.01] | 0.22 [0.01] | 0.19 [0.01] | 0.22 [0.02] | 0.09 [0.01] |
| School Qualifications | 0.12 [0.02] | 0.16 [0.01] | 0.14 [0.01] | 0.12 [0.02] | 0.11 [0.01] | 0.19 [0.01] |
| Vocational or trade Qualification | 0.36 [0.03] | 0.34 [0.02] | 0.35 [0.02] | 0.33 [0.02] | 0.30 [0.02] | 0.36 [0.02] |
| Bachelor or higher degree | 0.42 [0.03] | 0.37 [0.02] | 0.44 [0.02] | 0.47 [0.02] | 0.48 [0.02] | 0.30 [0.02] |
| Income (weekly) | 473.36 [27.75] | 546.98 [21.18] | 512.16 [21.37] | 489.81 [18.06] | 526.63 [16.69] | 661.22 [22.95] |
| Sample Size | 332 | 946 | 973 | 915 | 899 | 1075 |

Note: Weighted standard errors are in parenthesis.

Data Source: New Zealand Income Survey 2002-2007.

5.7 Mean Income Changes

Table 5.3

Mean Weekly Income Changes

| Average Incomes \$ | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|------------------------------------|--------|--------|--------|--------|--------|--------|
| <i>All Persons</i> | | | | | | |
| Employed | 559 | 584.30 | 582.60 | 610.40 | 616.80 | 648.90 |
| Unemployed | 1.51 | 1.08 | 2.21 | 0.35 | 1.38 | 6.90 |
| Females | | | | | | |
| <i>Subgroup</i> | | | | | | |
| Employed | 591.30 | 621.50 | 634.80 | 621.40 | 641.80 | 628.90 |
| Unemployed | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Total Sample Pop</i> | | | | | | |
| Employed | 474.50 | 494.90 | 494.80 | 500.70 | 522.10 | 541.40 |
| Unemployed | 3.07 | 0.30 | 4.04 | 0.61 | 0.46 | 3.79 |
| Males | | | | | | |
| <i>Subgroup</i> | | | | | | |
| Employed | 661.80 | 784.70 | 740.80 | 668.30 | 708.80 | 840.80 |
| Unemployed | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Total Sample Pop</i> | | | | | | |
| Employed | 623.40 | 645.50 | 650.70 | 701.80 | 691.20 | 732.40 |
| Unemployed | 0 | 1.72 | 0 | 0 | 2.77 | 6.84 |
| Proportion with zero income | 13% | 14% | 14% | 14% | 12% | 12% |
| Proportion with benefit income | 30% | 29% | 28% | 27% | 29% | 31% |
| Proportion not in the Labour Force | 34% | 34% | 34% | 33% | 32% | 32% |

Notes: Weighted Standard Errors. CPI adjusted base year 2006.

Data Source: New Zealand Income Survey 2002-2007.

All employed females in the subgroup experienced an increase in incomes from 2002-2004 and then a decline in 2005. The highest income value for females in this subgroup occurred in 2006 before declining again in 2007. This pattern differed from the pattern evident for employed females across the total sample population (fig. 5.1) where average income values increased across the entire timeframe with only a slight decline from 2003-2004. This resulted in both groups having a real income gain across the entire time period of 2% and 14% respectively.

Males in the subgroup of likely student loan holders experienced a similar increase from 2002-2003 but then a decline from 2003-2004. This decline

continues from 2004-2005 before increasing from 2005-2007. Males in the total sample experienced an increase in average total income for the employed individuals from 2002-2005 then a decline in 2006 before increasing again in 2007. This resulted in a real increase in incomes of 27% and 17% respectively. Wages of employed females in the total sample was on average 34% lower than their male counterparts highlighting the existence of gender inequality, however the value for the subgroup was only 18% suggesting tertiary education may mitigate some of these effects.

Women within the subgroup have much higher wages than employed women in the total sample population (24% on average). While males in the subgroup also have higher incomes on average than males in the total population this is only by 9% on average across the timeframe. This suggests the economic returns to education for females are much higher than for their male counterparts.

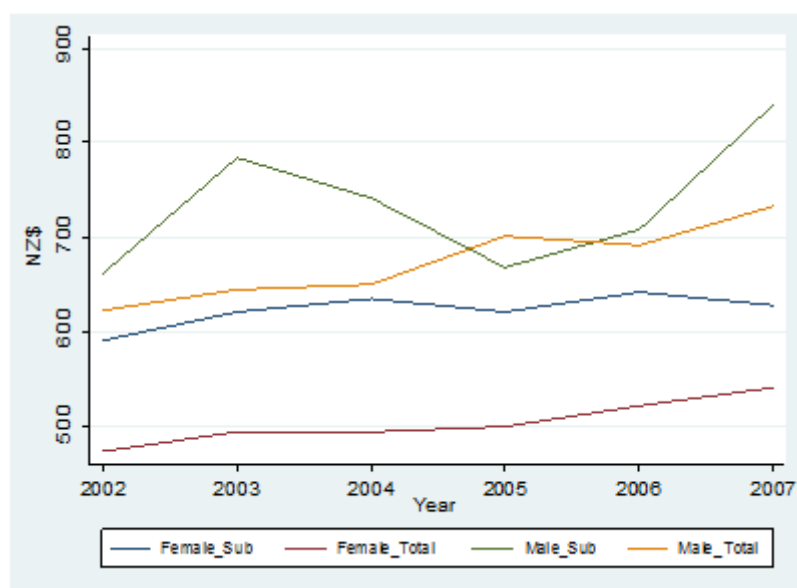


Fig. 5.1: Mean Weekly Income Changes

Interestingly, although there is quite a lot of variation evident in the mean income values across the sample the proportion of individuals with zero income or who are receiving some type of beneficiary payment is relatively stable. Participation in the labour force increases over the sample period which does not include individuals enrolled in educational institutions. This is surprising as it would be assumed the introduction of the blanket subsidy would attract more individuals into study which should increase non-participation in the labour force, however

enrolment in educational institutions is just one of five possible rationales given by the NZIS which explains non-participation in the labour force.

5.8 The impact of inequality across predicted student loan holders

This section presents inequality estimates using the Gini, p90/p10, and Atkinson measures of inequality. This allows comparison between the sub group of likely student loan holders and the total population, as well as, comparison before and after the introduction of interest free student loans in 2006.

Table 5.4
Inequality Measures

| Year | Gini Coefficient | | p90/p10 | | Atkinson Index (1) | |
|------|---------------------|--------------|---------|--------------|--------------------|--------------|
| | Sub Pop | Total Sample | Sub Pop | Total Sample | Sub Pop | Total Sample |
| 2002 | 0.295 | 0.352 | 4.000 | 5.682 | 0.179 | 0.223 |
| 2003 | 0.319 | 0.359 | 4.792 | 5.826 | 0.192 | 0.226 |
| 2004 | 0.293 | 0.357 | 4.591 | 6.045 | 0.181 | 0.229 |
| 2005 | 0.281 | 0.353 | 5.252 | 5.360 | 0.171 | 0.223 |
| 2006 | 0.260 | 0.344 | 4.583 | 5.333 | 0.147 | 0.214 |
| 2007 | 0.312 ¹⁷ | 0.335 | 5.760 | 5.276 | 0.188 | 0.204 |

Notes: Weighted Standard Errors.

Data Source: New Zealand Income Survey 2002-2007.

Inequality recorded using the Gini coefficient¹⁸ for the subgroup of likely student loan holders was the lowest in 2005 (0.260) while the highest inequality estimate was evident in 2003 (0.319). This was not confirmed by the results of the 90/10 where the lowest value was recorded in 2002 and the highest value was recorded in 2007. This suggests the changes in income distribution are being driven by both changes at the extremes and at the mode of the distribution. The results of the Gini measure of inequality are confirmed by the Atkinson. Decomposing this effect it is evident this shift is due to a combination of both poorer people getting poorer

¹⁷ Two outliers were excluded due to very large weekly income values

¹⁸ The Gini coefficient values range from 0 (perfect equality where everyone has the same income) to 1 (complete inequality where one person has all the income and the rest have none).

and richer people getting richer. Looking specifically at the changes which occurred after the introduction of the policy it is evident inequality decreased from 2005-2006 however, this is not sustained through 2007 with all three measures increasing in 2007 to levels which were much higher than all previous values.

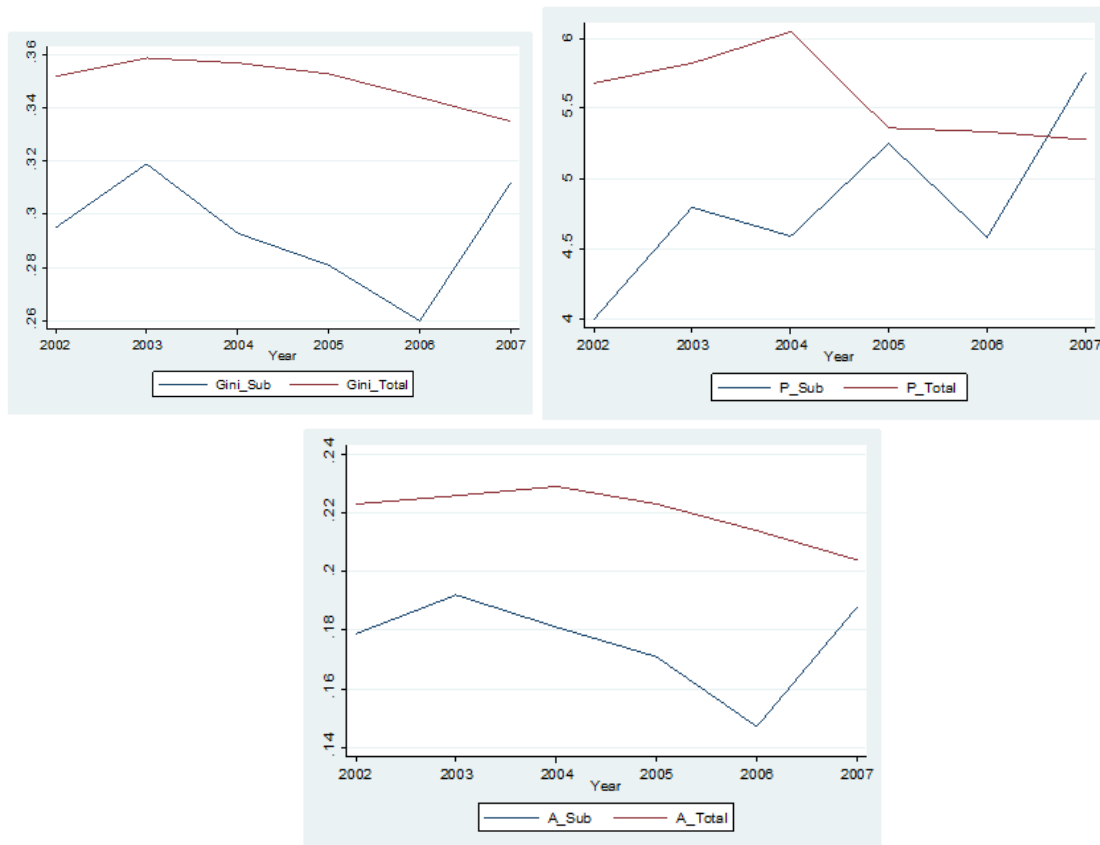


Fig. 5.2. Measures of Inequality for the subgroup and total sample population 2002-2007.

Graphing all three inequality measures below makes it visibly obvious there is a much larger variation in inequality within the subgroup of likely student loan holder values than the total sample population. Due to data restrictions the conclusions from these inequality measures are restricted to identifying general trends in inequality. However, the general trends in inequality particularly for the subgroup of most likely student loan holders are likely to include the specific effects of the introduction of the blanket subsidy in 2006.

One particularly interesting trend from all three graphs is the increase in inequality from 2006-2007 which occurs for the subgroup but not for the total population. This suggests inequality may in fact be worsening since the introduction of zero interest for the group of likely student loan holders.

5.8.1 Lorenz Curves – Subgroup

A Lorenz curves for this subgroup of the population over the sampling time frame 2002-2007 is presented below.

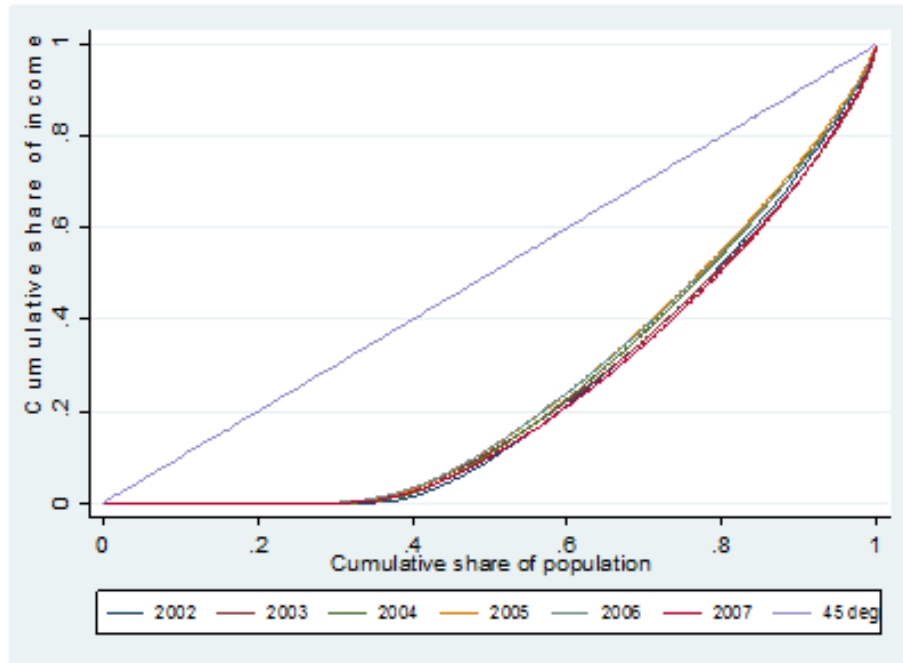


Fig. 5.3. Lorenz Curve 2002-2007.

Results from this Lorenz curve confirm the results given from the aforementioned Gini coefficient that 2005 had the lowest inequality value. However, 2005 does not hold Lorenz dominance over all of the other years, particularly at the bottom of the distribution where it appears 2005 is one of the most unequal curves. Additionally, results from 2003 which recorded the lowest inequality value using the Gini and Atkinson measures of inequality, does not hold Lorenz dominance over the entire distribution. The most unequal curve towards the top of the distribution is 2007. Results from this section suggest looking more in depth at changes within the distribution may provide more valid insights into the changes in inequality. However, the results from 2007 suggest the introduction of the blanket subsidy on student loan interest rates may be having a regressive effect specifically on those within the top of the income distribution.

5.8.2 Kernel Density Functions

Identification of the income distribution and shifts to this distribution over time can provide additional information regarding policy changes. A Kernel density function will examine logged CPI-adjusted weekly income values (base year 2011Q1) for both the subgroup and total population from 2002-2007. The x-axis labels have been converted to NZ dollars to add interpretation.

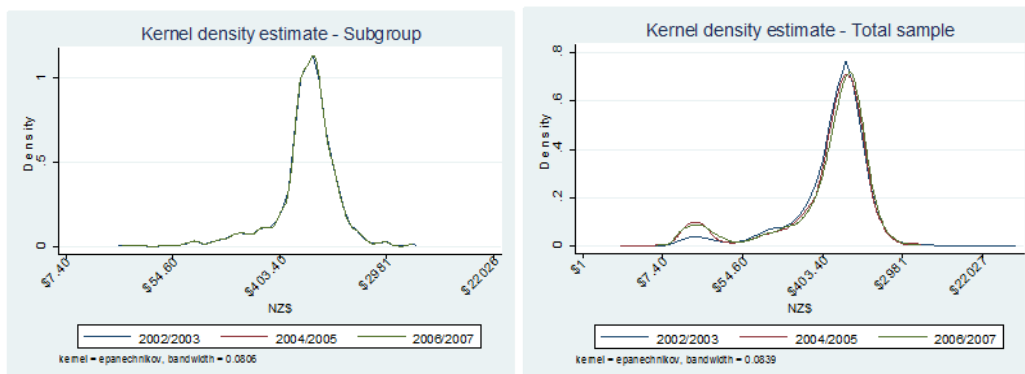


Fig. 5.4. Kernel Density Functions for the subgroup and total sample populations 2002-2007.

Looking at the results for the subgroup of likely student loan holders shows the highest peak of the kernel density function occurs at approximately \$800NZ per week. This occurs across all three time periods and there appears to be no significant change between any of the three time periods included. This suggests the impact of the blanket subsidy on student loan interest rates may not have significantly changed weekly income values. This result is not particularly surprising due to the income contingent repayments not altering the amount of monthly repayments.

One interesting difference between the subgroup and the total sample is the peak in incomes in the total sample occurs at a slightly lower income value of approximately \$700NZ per week. This suggests the income returns from tertiary education are significant when compared to the average of the total population. The total sample also appears to be slightly bimodal with a small peak occurring at a very low income less than \$40NZ per week.

5.9 Propensity Score Matching

This section uses propensity score and kernel matching techniques in order to match the subgroup of likely student loan holders with older similar individuals. This is to identify if the subgroup of likely student loan holders have lower incomes simply due to age rather than the effects of the blanket subsidy on student loan interest. Ideally this analysis would be undertaken using longitudinal data, where individual income could be tracked over time, however these techniques provide a valid substitute.

Figure 5.5 below displays the distribution of propensity scores for the subgroup and total population for 2002-2007 using histogram graphs. It is apparent that although some of the sample population exhibit characteristics similar to those in the subgroup of likely student loan holders a large majority of the sample population do not. This is not unexpected due to the high percentage of the total population of New Zealand who do not have a student loan. An implication of this result is that analysis will be restricted to the areas of overlap or common support where the two distributions overlap. Therefore, individuals who have a very low probability of being a student loan holder will not be included in analysis.

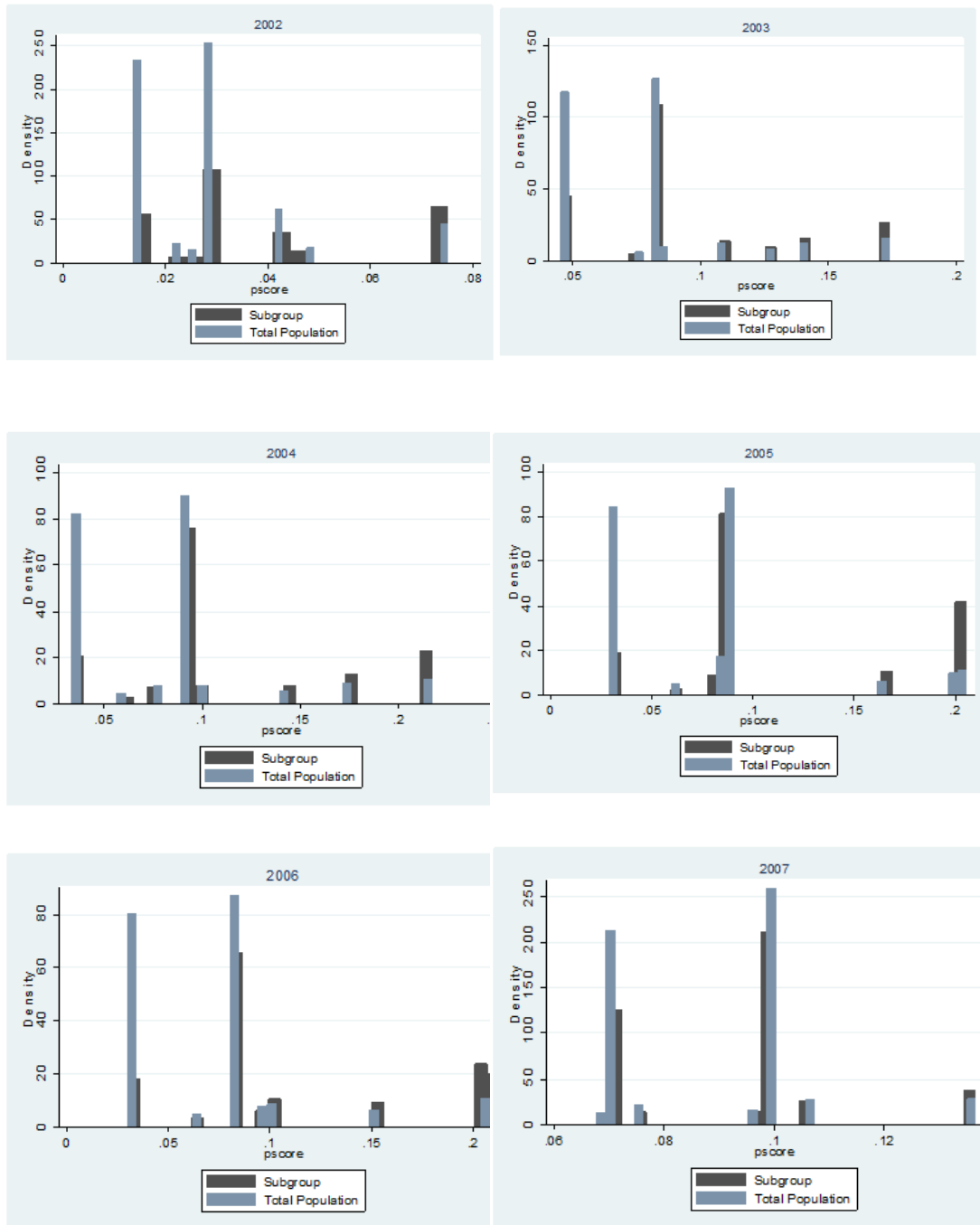


Fig. 5.5. Histogram of propensity score densities from 2002-2007 for the age bracket 35-55.

Matching individuals who are likely to be student loan holders with older but similar counterfactuals used the covariates ethnicity and gender. This allowed the average treatment effect of the expected loss in weekly earnings for those likely student loan holders to be compared with their older counterparts. Results from

this showed that the average loss in weekly income for the subgroup ranged significantly from \$81-\$123.

Table 5.5
Kernel Matching (age 35-55)

| Year | ATT \$ per week | S.E |
|------|-----------------|------------|
| 2002 | -117.30 | (25.01)*** |
| 2003 | -80.50 | (16.72)*** |
| 2004 | -101.80 | (15.64)*** |
| 2005 | -120.70 | (12.94)*** |
| 2006 | -123.43 | (14.05)*** |
| 2007 | -92.80 | (18.67)*** |

Notes: All matching includes gender and ethnicity. Bootstrapped Standard Errors reps (100).

***significant at 1%.

** significant at 5%.

* significant at 10%.

Data Source: New Zealand Income Survey 2002-2007.

The negative relationship evident across all of the years provides support for the assumption that younger individuals earn less than their older counterfactuals. The magnitude of this effect differs across the years, which suggests the effect is not a fixed and constant effect. The lowest significant difference recorded occurred in 2003 before the blanket subsidy was introduced. The highest difference was recorded in 2006 the year the blanket subsidy was introduced. Results suggest that individuals before the introduction of the blanket subsidy were already more likely to earn more in later years by an average of \$105 per week. After the introduction of the policy individuals were more likely to earn an average of \$108 per week. This suggests the inequality of incomes in the subgroup may be driven by age effects and providing a subsidy to this group of individuals may in fact not be positively impacted inequality.

Repeating this exercise for individuals aged 45-65 gives an additional picture of the average treatment effect when compared to similar counterfactuals in this older age bracket. The average treatment effect for this group over this timeframe ranged from \$53-\$97 which is a smaller range than those aged 35-55.

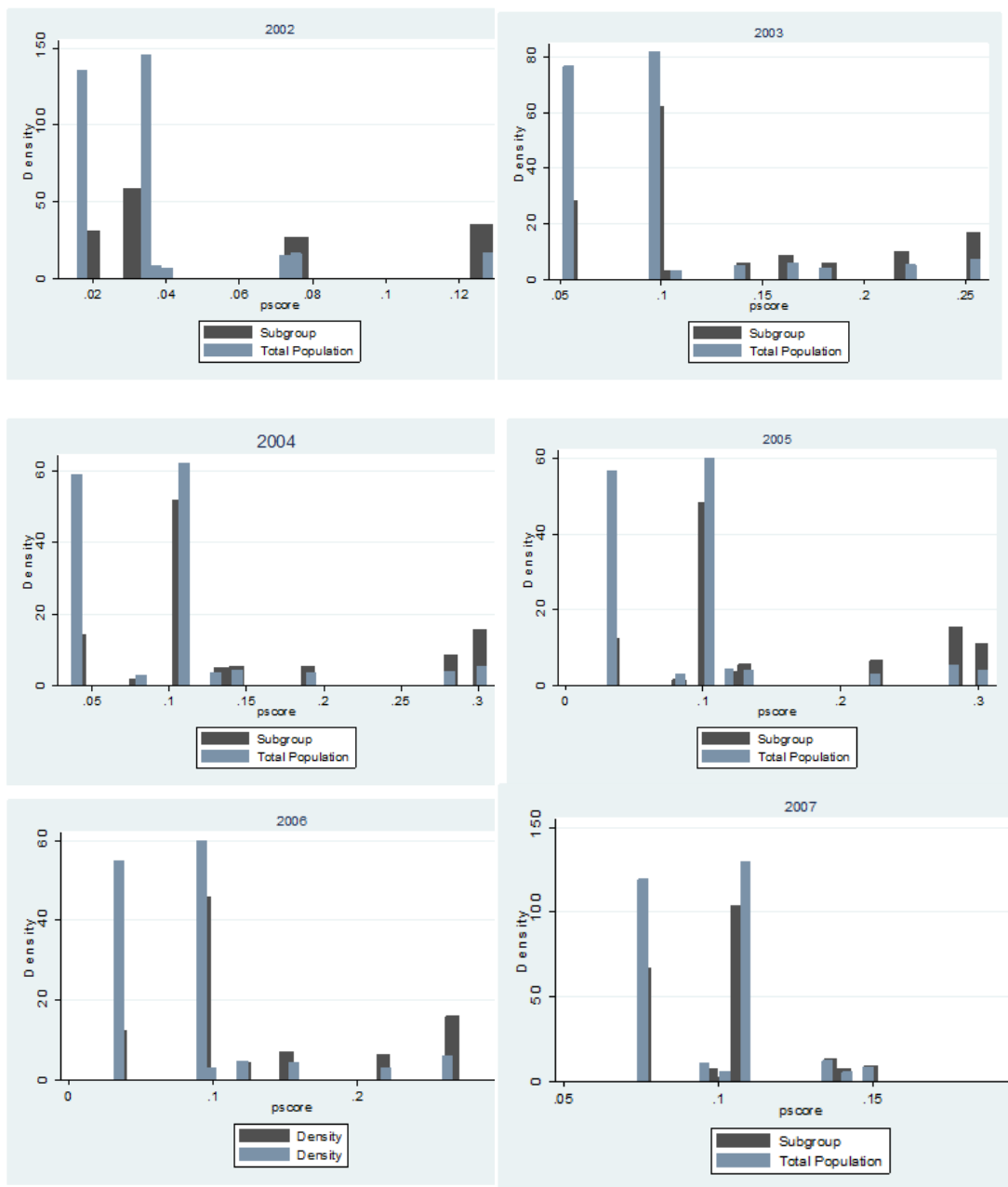


Fig. 5.6. Histogram of propensity score densities from 2002-2007 for the age bracket 45-65.

Table 5.6
Kernel Matching (age 45-65)

| Year | ATT \$ per week | S.E |
|------|-----------------|---------|
| 2002 | -24.10 | (27.38) |
| 2003 | -15.85 | (16.09) |
| 2004 | -0.10 | (17.92) |
| 2005 | -21.90 | (12.47) |
| 2006 | -22.70 | (14.67) |
| 2007 | -19.60 | (16.57) |

Notes: All matching includes gender and ethnicity. Bootstrapped Standard Errors reps (100).

***significant at 1%.

** significant at 5%.

* significant at 10%.

Data Source: New Zealand Income Survey 2002-2007

The results of the comparison between likely student loan holders and their counterfactuals aged 45-65 appears to have no significance results across this time period. This suggests wages between likely student loan holders and much older counterfactuals does not significantly change over time. This result is particularly interesting as it suggests investment in tertiary education may have a diminishing impact on income over time and play a less important role as individual's age.

5.10 Inequality in earnings, wages and expenditure

This section examines changes in hourly, weekly, and annual income figures to identify any trends in income for the subgroup of likely student loan holders and the total sample population from 2002-2007. These income figures will be decomposed into five percentile groups (10th, 25th, 50th, 75th, and 90th) to identify where in the income distribution income changes may be occurring. Additionally, ratios between these percentile groups will be presented to show how the gap between the richest and the poorest deciles compares with the median.

It is expected that the majority of incomes for this subgroup will experience no change because of the introduction of zero interest on student loans due to the income contingent repayment component. Income contingent repayments are a fixed proportion and therefore, monthly repayments remain constant but the

duration of repayments will be reduced. The exception to this is the 9% of likely student loan holders who will now pay off their loans prior to the timing of this survey when previously this would not have been the case. The disposable income values for this group will be higher in 2007 than prior, due to the elimination of their student debt. Figure 5.7 displays the 10th, 25th, 50th (the median), 75th and 90th percentiles for i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income across the subgroup of the total population who are most likely to be student loan holders, and who are earning an income¹⁹.

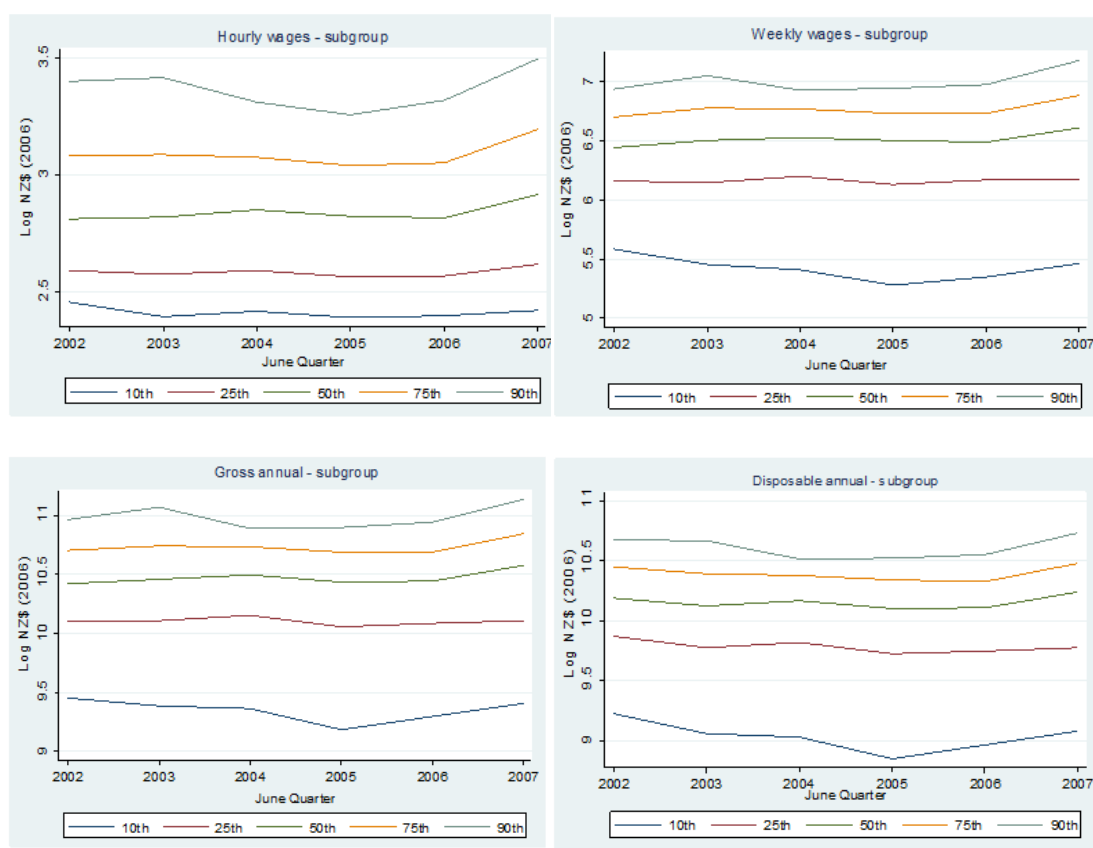


Fig. 5.7. Percentile graphs for hourly, weekly, and annual income for the subgroup from 2002-2007.

Firstly, looking at results of fig. 5.7 displaying hourly wages it appears no large deviations in hourly wages occurred over the time span across all percentile groups. Deviations did occur which were specific to each percentile group for example, those in the 90th percentile experienced the most variations across the

¹⁹ One outlier was excluded due to a very low recorded hourly income which skewed results.

time period, initially experiencing an increase of 2% in 2003 which was followed by a decrease of 10% and 5% in 2004/2005 respectively and then a subsequent increase of 6% and 19% in 2006/2007. The median percentile and the 75th percentile showed an increase of 1% from 2002-2003 while the 10th and 25th percentile decreased by 6% and 1% respectively. All four percentile groups then experienced a small increase (3%, 2% and 3% respectively) except the 75th percentile who experienced a slight decrease (1%) from 2003-2004. From 2004-2005 all four percentile groups experience a decrease of between 2 and 3 percent. All four percentile groups then experience a very small change of less than 1% from 2005-2006. Finally, from 2006-2007 all percentile groups experienced a large increase (2%, 5%, 11%, and 15% respectively). Interestingly, although all percentile groups experienced an increase from 2006-2007 this effect was the largest for the richer percentile groups. This corresponds with 2007 having the second highest inequality value and suggests changes in hourly wages may be driving this inequality estimate.

Looking at the significant changes to weekly wages it appears the changes are similar in direction across the median, 75th and 90th percentiles from 2002-2003. All three percentile groups experience an increase of 6%, 8% and 12% respectively while the 10th percentile group decreases by 12% during this time period. This decrease continues from 2003-2004 for the 10th percentile group and for the 75th and 90th percentile groups (4%, 1% and 11% respectively) and again the 10th, 25th, median and 75th percentile groups all experience a decrease from 2004-2005 (12%, 7%, 3% and 4% respectively). This is followed by an increase for the 10th, 25th and 90th percentiles from 2005-2006 of 7%, 4% and 3%. This increase continues for all five percentile groups from 2006-2007 (12%, 1%, 13%, 17% and 23% respectively).

This variability is surprising as weekly wages are often less volatile than hourly wages as individuals will typically substitute more or less hours to counteract a decrease or increase in hourly wages (income smoothing). The large volatility evident in the 10th percentile suggests that although individuals may have been experiencing some volatility in hourly wages this is exacerbated in weekly wages by individuals either choosing to work more (increase) or less total hours (decrease). The decrease evident from 2004-2005 correspond with the trends in

part time work recorded in the HLFS where part time work increased from 2004-2005 which may be contributing to this effect (Statistics New Zealand, 2012c).

Next examining total gross and disposable annual income, the changes mimic that of the weekly wage changes which is not surprising, however the magnitude of the changes differs. The changes experienced in the 10th, 25th, 50th and 75th percentile from 2002-2003 have all halved in size, while the change for the 90th percentile remains relatively constant. Changes which occurred for the 10th, 25th and 50th percentile groups from 2004-2005, was an increase of 3% on average. Finally, the increase experienced for all five percentile groups from 2006-2007 has increased in magnitude by 2% for those in the 25th and 50th percentile when compared to weekly values, while those in the 90th percentile group experienced a 2% drop in magnitude. This is likely to have reduced income inequality between 2006 and 2007.

Comparing the changes between gross income and disposable income values in 2007, it appears no significant difference is evident. This suggests the impact of the 9% of individuals finishing their student loan repayments is not large enough to drive a difference in the disposable values.

Figure 5.8 displays the 10th, 25th, 50th (the median), 75th and 90th percentiles for i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income across the total sample population. Graphing the total sample population allows a baseline to identify changes which were evident across the entire sample rather than those most likely to be a student loan holder. Excluding gross annual figures the hourly, weekly and disposable figures are much less variable. Interestingly, the trends evident in the gross annual figures do not correspond to the trends evident in the subgroup data.

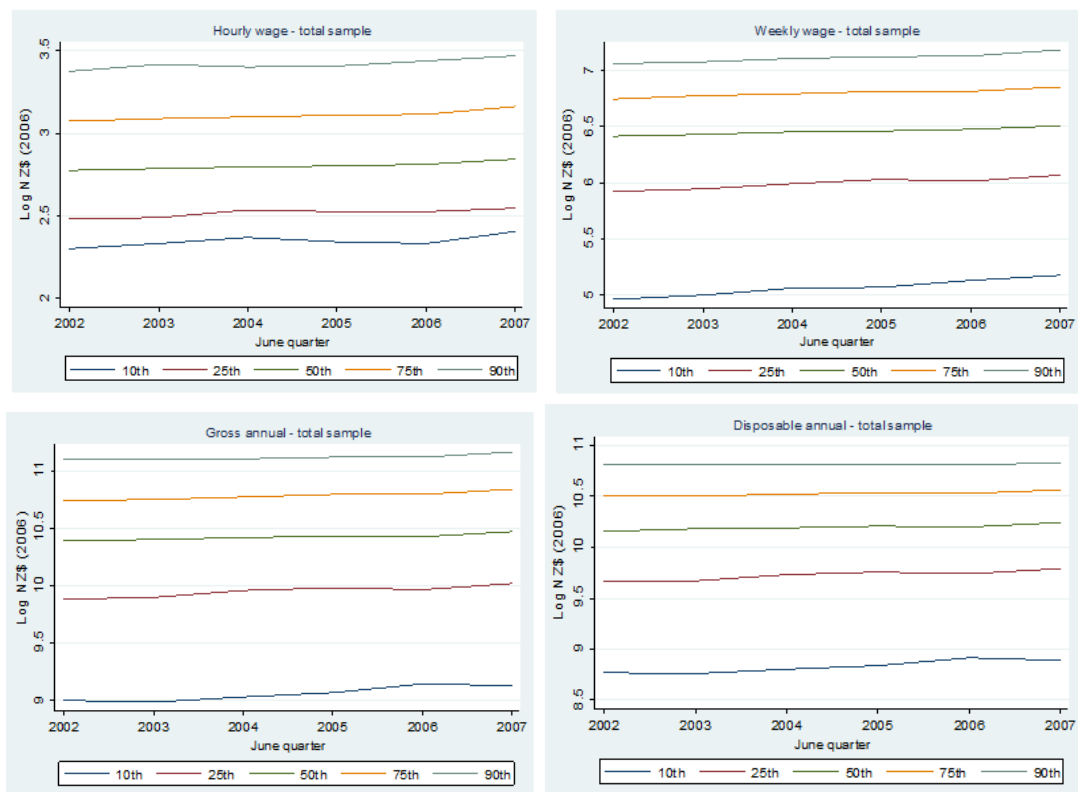


Fig. 5.8. Percentile graphs for hourly, weekly, and annual income for the total sample population from 2002-2007.

Examining the trends evident in hourly wages for the total population shows much less variation than the subgroup. All of the percentage changes across the years for each percentile group are under 5% with the exception of hourly wages for those in the 10th which increased by 8% from 2006-2007. Examining weekly wages again shows little variation between the years except for an increase across all percentile groups in 2007 ranging from 3%-6%. One interesting observation is while all percentile groups were either decreasing or only slightly increasing from 2005-2006 those in the lowest 10th percentile experienced a 7% increase. This corresponds to a lesser extent to the pattern seen in the sub sample of likely student loan holders who experienced a 12% increase. Comparing total gross and disposable annual income, it is evident only a small amount of variation occurs across the time period. An exception to this is the 8% (8% after taxes) increase experienced by those in the bottom 10% from 2005-2006.

One notable feature is that those in the 10th percentile do not earn significantly less than those in the 25th percentile when looking specifically at hourly wages.

However, when examining weekly wages those in the 25th percentile are earning over double those in the bottom 10th percentile. It is likely those in the bottom 10th percentile are restricted in the number of hours they are able to earn and this results in the much lower weekly income values. This has a flow on effect on gross and disposable annual earnings where those in the bottom 10th percentile earn less than half of those in the 25th percentile.

The large variation in the subgroup is not unexpected due to the smaller number of sample observations. However, there are distinct trends in the sub sample which are not emulated in the total sample. This suggests there may be some factors influencing earnings of those who are most likely to hold a student loan which is not influencing the rest of the population. In particular, the drop from 2004-2006 and then the spiked increase in 2006-2007 experienced by all percentile groups is not evident in the total sample population.

These results are particularly interesting as theoretical predictions suggest no income changes should have occurred immediately after the introduction of interest free student loans. This was because student loan repayments are restricted by income contingent repayments which mean that only the duration of the loan not the monthly repayment amount is less. This was not the case evident in the above data. Results suggest further investigation into the cause of these income changes and how these income changes have impacted the distribution of income would be interesting. The following section includes percentile comparisons to identify how these income changes have affected the distribution of income between the richest and poorest individuals and the average earning individual.

5.10.1 Inequality below the median - Sub Sample

This section will now compare these income changes for the lower end of the income distribution by comparing the difference between the 10th and 25th percentile values with the median or 50th percentile value for the sub population. The difference in i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income, is equivalent to the ratio of the 10th and 25th percentile with the 50th percentile in

levels. These figures show how the poorest individuals' incomes compare to the average individuals' incomes.

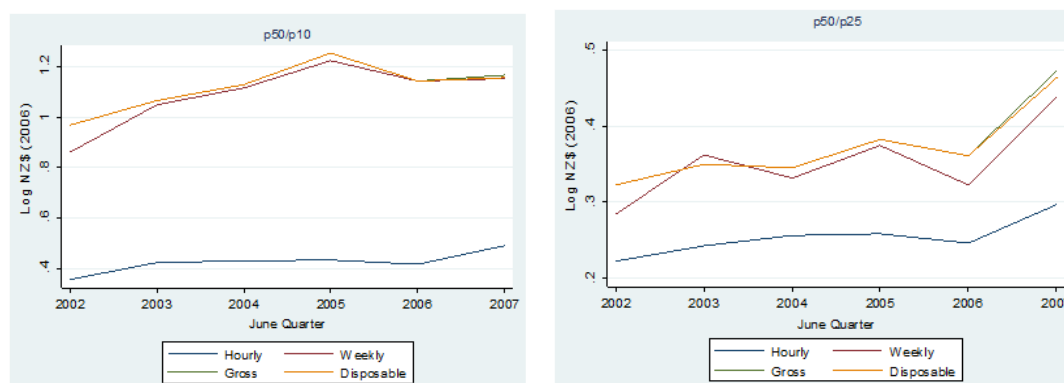


Fig. 5.9. Percentile ratios p50/p10 and p50/p25 for the subgroup from 2002-2007.

Results from the 50/10 percentile ratio show on average a steady increase in inequality between the median and the 10th percentile in hourly wages across the entire timeframe. In particular this gap increases significantly from 2006-2007. Weekly or individual income, (measured either by gross or disposable income) shows a similar increasing trend from 2002-2005, before decreasing from 2005-2006 and then increasing again from 2006-2007.

The outcome of hourly wages for the 50/25 percentile ratio appears slightly more variable than the 50/10 percentile ratio but it is on a much smaller scale. All four variables appear to increase on average across the entire timeframe. There does appear to be a decrease in income inequality from 2005-2006 which includes the introduction of the blanket interest subsidy on student loans. However, all four measures experience a significant increase from 2006-2007 which suggests this result was not sustained and in fact income inequality for this group has worsened.

5.10.2 Inequality above the median – Sub Sample

This section will now compare the upper end of the income distribution by comparing the difference between the 90th and 75th percentile values with the median across the sub population. The difference in i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income, is equivalent to the ratio of the 90th and

75th percentile with the 50th percentile in levels. This allows comparison of the richest individuals with the median.

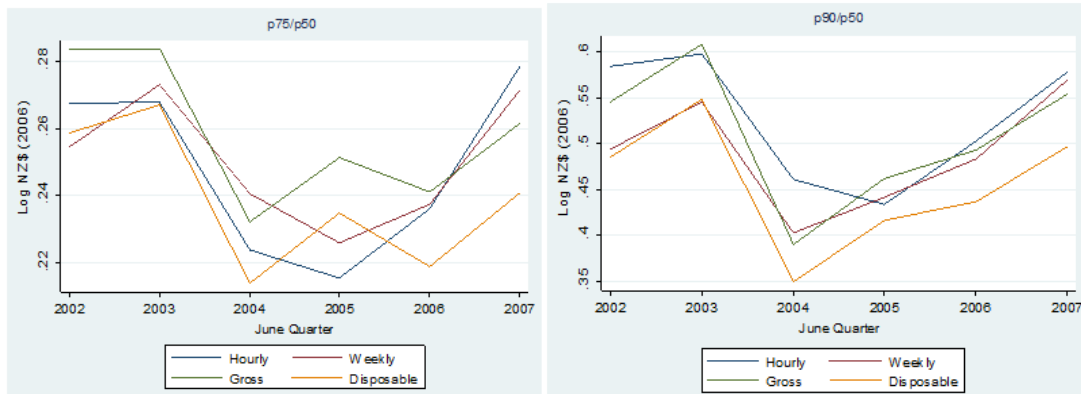


Fig. 5.10. Percentile ratios p90/p50 and p90/p75 for the subgroup from 2002-2007.

Results from the 75/50 percentile ratio show there is a spike in hourly and weekly wages from 2002-2003 before a significant decrease from 2003-2005. This is then followed by a large increase from 2005-2007. Individual income (measured by either gross or disposable) variables follow a similar trend to hourly wages but experience an increase from 2004-2005 and a decrease from 2005-2006. Looking at the top of the distribution (i.e. the 90/50 distribution) it appears the same trend is occurring but the increase starts slightly earlier in 2004. This large increase in particular from 2005 onwards is worrisome as this time period is inclusive of the interest free student loan policy introduction.

5.10.3 Inequality below the median – Total Sample

This section will now continue from the previous analyses and compare the lower end of the income distribution for the total sample population using the 50/10 and 50/25 percentile ratios. The difference in i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income, is equivalent to the ratio of the 10th and 25th percentile with the 50th percentile in levels.

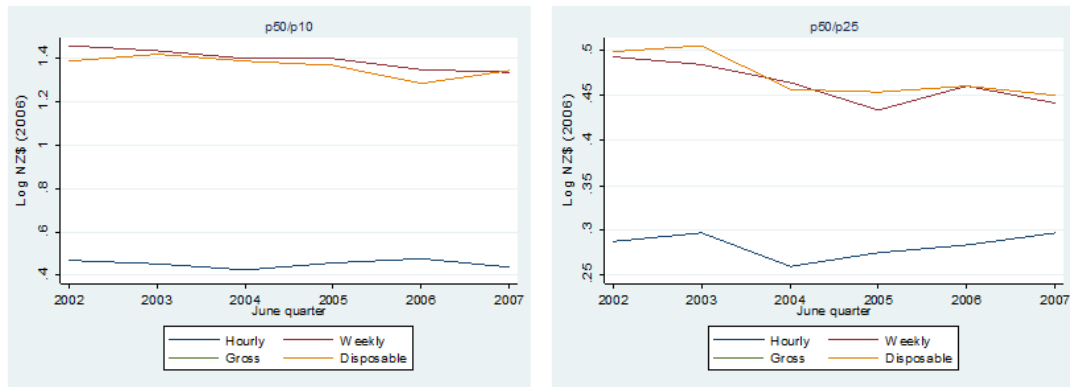


Fig. 5.11. Percentile ratios p50/p10 and p50/p25 for the total sample from 2002-2007.

Both figures show little change in either wage or earnings inequality across the sample period particularly in comparison to the subgroup. Both percentile ratios decrease over the entire sample period in terms of weekly and individual income. Hourly wage inequality steadily increased from 2004-2007 in the 50/25 percentile ratio which suggests worsening inequality for this group.

5.10.4 Inequality above the median – Total Sample

This section compares the upper end of the income distribution for the total sample population using the 75/50 and 90/50 percentile ratios. The difference in i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income, is equivalent to the ratio of the 75th and 90th percentile with the 50th percentile in levels.

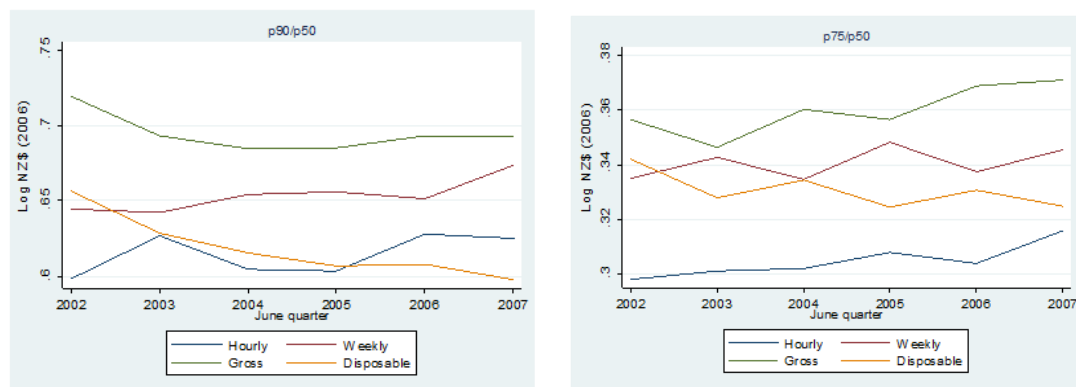


Fig. 5.12. Percentile ratios p90/p50 and p90/p75 for the total sample from 2002-2007.

Both measures of the wage and earnings inequality in the upper distribution display increases from 2002-2007 in all measures excluding disposable income. This departure of disposable income and gross income is likely due to the increase in ACC levies which occurred in 2005. This is a proportional tax i.e. those on a higher income are expected to pay more in total which has likely had a positive impact on equality.

Although wage and earnings inequality has increased for hourly and weekly wages it is important to take into account the scale of both of the ratios as it is an increase which is relatively small in magnitude 2% and 3% for 90/50 and 75/50 percentile ratios respectively for hourly wages and 1% and 3% for 90/50 and 75/50 percentile ratios respectively for weekly wages.

Interestingly, results from the total sample appear almost contradictory to results from the subgroup of likely student loan holders. This does not adhere to theoretical predictions which suggested incomes of student loan holders should not be immediately affected due to income-contingent repayments. However, this may be because of an external factor which is simply more likely to affect individuals who hold the characteristics of the subgroup for example, higher education attainment. The next section will examine income changes for different types of education in order to establish if this is a factor which is driving these results.

5.10.5 The impact of education on inequality

This section will examine the inequality changes across groups with different educational backgrounds i) No qualifications ii) School qualifications iii) Post school qualifications²⁰. This highlights the differences which arise due simply to returns to qualifications. This will be compared to prior analysis which focused on a subgroup of most likely student loan holders. This is in order to identify any differences which may have occurred to the subgroup which did not occur solely due to the returns received from having a higher qualification.

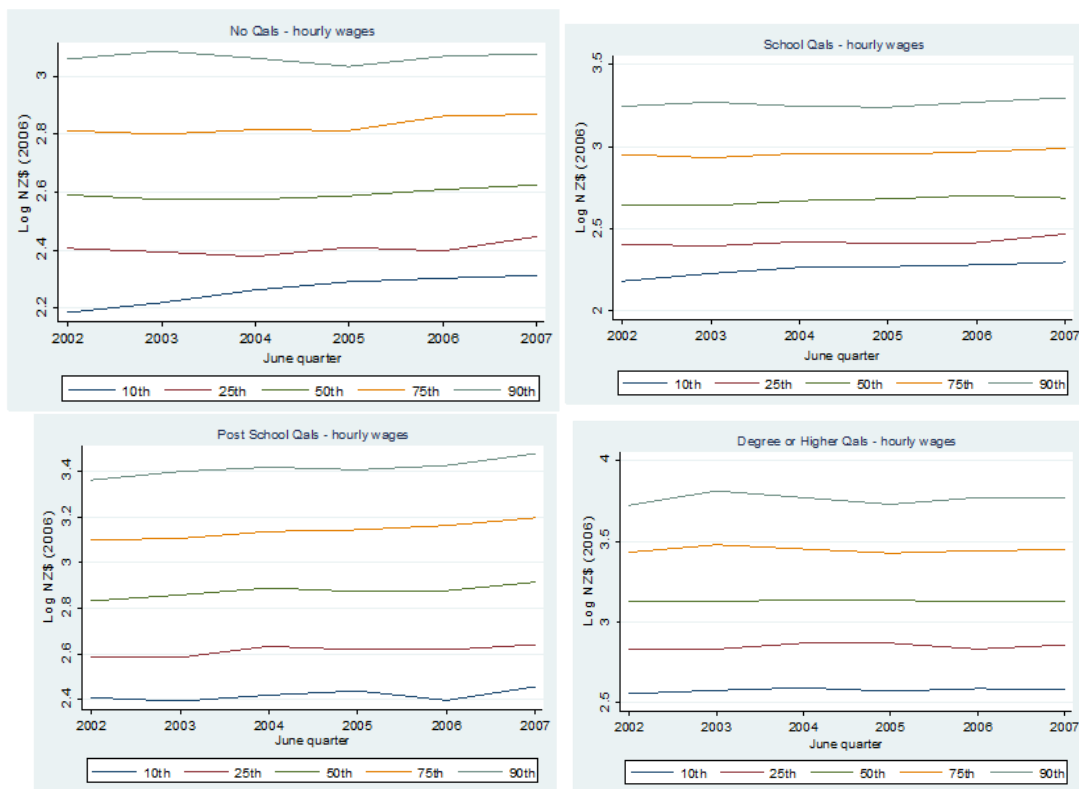


Fig. 5.13. Percentile graphs for hourly wages across different educational backgrounds from 2002-2007.

Looking at hourly wages for individuals with no qualifications across all percentile groups shows an increase from 2002-2007, with the largest percentage increase occurring for the bottom 10th percentile group (14%). Due to the increase for those in the bottom 10th percentile, within-group inequality has decreased by 6%

²⁰ This category combines both post school qualifications and trade and vocational qualifications to aid comparison.

across the time period. This pattern is also exhibited by individuals who held school qualifications with hourly wages across all percentile groups increasing across the entire time frame. Again, it was the bottom 10th percentile group who exhibited the largest increase with an 11% increase. Individuals with post school qualifications (including trades) experienced an increase across all percentile groups with the largest increase occurring in the top 90th percentile group (12%). The 75th percentile group and the median value increased by 10% and 8% respectively which increased within-group inequality by 16%. Interestingly, although those who held a degree have also experienced an increase in hourly wages across all percentile groups from 2002-2007, the increase is much smaller than for all of the other qualification groups which suggests the monetary returns from tertiary education may be diminishing.

Looking specifically at individuals who hold a degree across i) log hourly individual income ii) log weekly individual income if employed iii) log annual individual income and iv) log disposable income enables comparison to the prior subgroup analysis. Any significant patterns which occur only in one group are likely to have occurred due to an outside influence rather than possessing a degree or higher qualification.

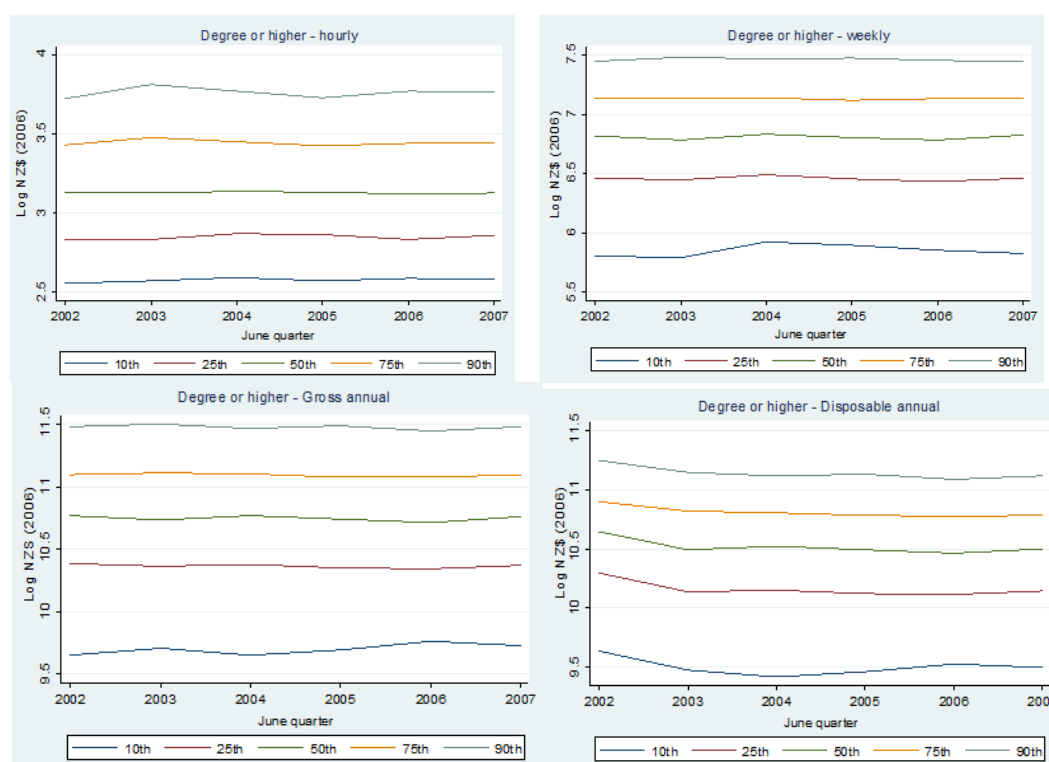


Fig. 5.14. Percentile graphs for hourly, weekly, and annual income for degree holders or higher from 2002-2007.

Very similar patterns occurred across both groups in terms of hourly wages, although slightly less variation occurred in the group of individuals who held a degree or higher qualification. Interestingly, the decrease which occurs in the subgroup in 2005 for the bottom 10th percentile across all four income variables is not evident across all degree holders. This suggests an effect which is only relevant for holders of a student loan in the bottom 10th percentile may be driving the results evident in weekly wages. For example, student loan holders may be more likely to switch to part-time work or return to study.

The sample of likely student loan holders is on average worse off across all four income measures than simply the sample of degree holders or higher. This is not unsurprising as student loans are financial mechanisms designed to provide financial aid to students, while some degree holders do not need this assistance. This does however provide some support towards the subsidisation of student loans as these individuals may have worse inequality because of characteristics which are unrelated to holding a degree or higher qualification. The next section investigates the different ways individuals in the subgroup of likely student loan holders source their income and the subsequent effects on inequality.

5.11 Decomposing Inequality

This section decomposes inequality by income source using a method developed by Lerman and Yitzhaki (1985). This method allows the impact of each income source on inequality to be examined for the subgroup of likely student loan holders. Lerman and Yitzhaki (1985) show that the Gini coefficient for total income G can be represented by:

$$G = \sum_{k=1}^K S_k G_k R_k \quad (5.6)$$

Where: S_k = share of source k in total income

G_k = the source Gini

R_k = Gini correlation of income from source k with the distribution of total income

This method can then be used to estimate the effect on total income inequality of a percentage change in income from a particular source. This is calculated by:

$$\frac{S_k G_k R_k}{G} - S_k \quad (5.7)$$

Using this method total income will be divided by 7 categories: Earnings from wages/salary, Self Employed earnings, Government Transfers (minus ACC), Overtime earnings, ACC payments, Private Superannuation payments, and Other income such as annuities²¹. Decomposing income into these 7 types allows investigation into how each source has contributed to inequality from 2002-2007.

Table 5.6 compares the decomposition figures using average values before and after the introduction of the blanket subsidy on student loan interest rates. Results reveal that earnings from wages and salary are the main income source across all years. Wage and salary income contributed between 79% and 88% of total income while always negatively contributing to equality. This effect remains constantly negative, however the effect of this impact is highest in 2002 and the lowest in 2007 as seen in fig. 5.15 below. Self-employment income has a negative effect in all years except 2005, which could be attributed to individuals substituting wages and salary for self-employed work. However, in 2005 self-employment income is positively associated with inequality. Government transfers excluding ACC have a positive effect on inequality across all of the years which is unsurprising as the role of targeted government transfers is to reduce inequality. Over time earnings represent a small share of income, but always negatively impact equality. A study by Carr (1986) profiled overtime workers as primarily married males aged 24-35. This supports overtime negatively contributing to equality as males in this age category are more likely to be higher income earners than their younger or much older counterparts.

It is also unsurprising that private superannuation or pension contributions are almost zero due to the negative coefficient on the age variable in the prior analysis

²¹ Typically the last three sources were excluded from analysis due to having no influence on the earnings of those within this select subgroup.

which suggested younger individuals were more likely to hold student loans. Younger individuals are also less likely to make superannuation or pension payments.

Table 5.7

Decomposition of Inequality – Pre Policy vs Post Policy

| | | | Salary | Self-employed | Benefit | ACC | Other | Overtime |
|---------------------------------------|-------|-----------|--------|---------------|---------|--------|-------|----------|
| Share of total income | (S) | Pre 2006 | 0.794 | 0.084 | 0.112 | 0.002 | 0 | 0.008 |
| | | Post 2006 | 0.807 | 0.072 | 0.110 | 0.003 | 0.004 | 0.007 |
| Gini coefficient by source | (G) | Pre 2006 | 0.516 | 0.971 | 0.837 | 0.748 | 0 | 0.983 |
| | | Post 2006 | 0.516 | 0.977 | 0.821 | 0.995 | 0.500 | 0.985 |
| Correlation with rank of total income | (R) | Pre 2006 | 0.883 | 0.615 | -0.315 | 0 | 0 | 0.733 |
| | | Post 2006 | 0.890 | 0.485 | -0.318 | -0.095 | 0.043 | 0.690 |
| Share of income inequality | (I) | Pre 2006 | 0.925 | 0.133 | -0.074 | 0.002 | 0 | 0.015 |
| | | Post 2006 | 0.972 | 0.089 | -0.075 | 0.001 | 0 | 0.013 |
| Relative income inequality | (I/S) | Pre 2006 | 1.164 | 1.591 | -0.667 | 0.747 | 0 | 1.833 |
| | | Post 2006 | 1.204 | 1.240 | -0.687 | 0.292 | 0.042 | 1.803 |
| Total income | | Pre 2006 | 0.392 | | | | | |
| | | Post 2006 | 0.382 | | | | | |

Notes: Income sources with a negative R and I act to reduce overall income inequality.

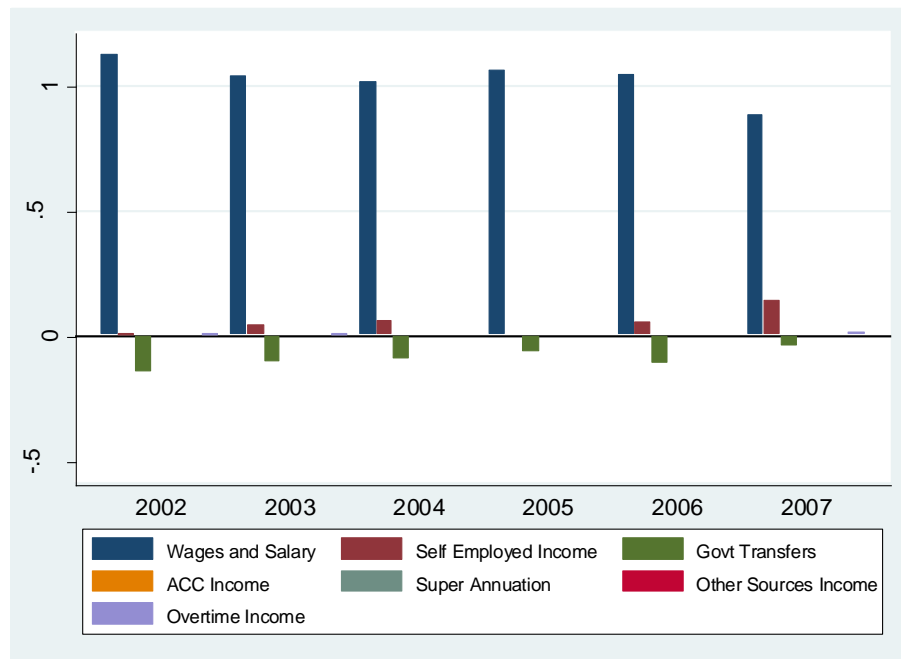


Fig. 5.15: Inequality by Income Sources

5.12 Conclusions

The general picture of inequality prior to the introduction of interest free student loans (2002-2005) and post introduction (2006-2007) reveals no consistent or sustained trends evident across the income and inequality measures. The average weekly income values for both male and female subgroups of likely student loan holders were higher than for the total sample population across the entire time period. This suggests the private returns to education are significant.

Since the introduction of this policy only average weekly incomes for males who are likely to be student loan holders have increased, while females from this subgroup only benefitted from 2005-2006 before their average weekly incomes decreased in 2007. Decomposing income effects using hourly and individual annual income (measured by either gross or disposable) also revealed no clearly identifiable trends pre and post policy introduction. These results are not unexpected as New Zealand student loan repayments are based on an income contingent scheme and therefore, this policy did not reduce the weekly or monthly repayment amounts, simply the duration of the loan. An exception to this was the group of individuals who repaid their loan faster in this timeframe than previously

if interest had continued to accrue. However, this group appears not to have significantly altered results.

Reducing inequality and increasing access to tertiary education was a main driver of this policy intervention which is supported initially by both the Gini and Atkinson measures of inequality as an increase in equality occurs from 2005-2006 however, this result is not sustained and equality decreases again in 2007. Further, comparing the subgroup of likely student loan holders to older, similar counterfactuals revealed that the subgroup of likely student loan holders is more likely to earn less simply due to their age, and that on average their 35-55 year olds were better off by \$100 per week. This result suggests providing a subsidy to a group of individuals who are already characteristically more likely to earn more over time may be an inefficient way to target inequality.

CHAPTER 6

PUBLIC ATTITUDES TOWARDS INEQUALITY

6.1 Introduction

Public preference for policy plays a significant role in influencing political outcomes for a representative democratic government (Burststein, 2003). This was evident when the Labour Party announced the decision to remove interest from all student loans in 2005, which was cited as the promise which won the Labour party another term. The decision to eliminate interest from all student loans was not a policy aimed at increasing efficiency, rather it was targeted at increasing fairness and educational equality by assisting students to overcome financial barriers to undertaking study (Ministry of Education, 2014).

The introduction of interest free student loans will also ensure that young people find it easier financially to acquire tertiary qualifications.

– Helen Clark (2005).

While it appears individuals in 2005 were concerned about educational equality it is interesting to investigate if this is consistent with current public attitudes. An up-to-date dataset which integrated individual's attitudes towards inequality, and the introduction of the blanket subsidy on student loans, would be the most appropriate to model attitudes since this policy change. A recent dataset would also be particularly useful as the world economic forum has released statistics that show income disparity has been voted as the number one global issue from 2012-2014 (World Economic Forum, 2014). However, due to the unavailability of such a dataset this chapter will examine how attitudes towards inequality have changed

in the last decade in New Zealand using International Social Survey Programme (ISSP) surveys collected by GESIS.

6.2 Data

International Social Survey Programme surveys are undertaken annually in approximately 48 nations. New Zealand has participated in the ISSP surveys since 1991, participating in 22 subsequent surveys where a probability-based nationwide sample of approximately 1128 adults has been surveyed at random from the total population each year. Topics vary annually, with the main focus on inequality in 1987, 1992, 1999, and 2009. The surveys from 1999 and 2009 will be used in this research as student loans were introduced post 1992 and therefore, attitudes towards inequality postdating this are the most relevant for this research. Approximately 1108 and 935 respondents were surveyed from New Zealand in 1999 and 2009 respectively. The ISSP survey collects detailed demographic information which can identify any differences between the 1999 and 2009 sample which may have influenced results. Both surveys used Likert-type style scales as a psychometric measure and the specific examples are provided in table 6.1 below.

6.3 Methods

The use of a Likert-type scale creates a latent variable across different possible attitudes with unknown distances between categories. In other words, how one individual interprets phrases such as “strongly agree” may differ from how another individual interprets it. This ordinal response variable influences which methods are most appropriate for the correct modelling of these attitudes. OLS results will be presented in order to facilitate comparisons with an ordered probit model. Less weight will be placed on the OLS results as this estimator becomes biased and inefficient with a categorical dependent variable. Such biases arise because of the assumptions of the OLS estimator. One set of assumptions includes the requirement that the data be distributed around some line such that $Y = \beta_0 + \beta_1 X_1$, with an error term of constant variance, and a mean of zero. McKelvey and

Zavoina (1975) have shown this is unlikely to occur for ordinal dependent variables, and subsequently can invalidate the conclusions drawn. The likely impact of this bias is that impacts of certain variables may be underestimated. Furthermore, OLS assumes that if two individuals give the same response they must have the same attitude. Although this is unobservable, a model should take into account the possibility of variation within responses (Daykin, & Moffatt, 2002).

Ordered probit models rely on the assumption that “the ordinal response is a latent, continuously distributed random variable representing propensity to agree” (Daykin, & Moffatt, 2002, p.158). This approach uses a non-linear maximum likelihood estimation procedure explained below which is not restricted by the above assumptions of the OLS model.

6.3.1 Ordered Probit model

Letting y represent the ordered response which can take on 5 possible values i.e. strongly agree, agree etc ($y = 1, 2, \dots, 5$) an ordered probit model can be derived from a latent variable model. The latent variable y^* is the unmeasured determinate of the y value where:

$$\begin{aligned} y^* &= \beta_1 x_1 + \dots + \beta_k x_k + e \\ &= x\beta + e \end{aligned} \tag{6.1}$$

This assumes e is normally distributed with a variance normalised to one. Next it is necessary to determine the threshold points for the continuous latent variable y^* . This is because the value of the observed y response is dependent on whether or not the individual has crossed a certain threshold. The threshold points are defined as:

$$\alpha_1 < \alpha_2 < \dots < \alpha_5$$

Although it is not possible to observe the latent variable it is possible to observe the choice an individual will make according to:

$$y = 1 \text{ if } y^* \leq \alpha_1$$

$$y = 2 \text{ if } \alpha_1 < y^* \leq \alpha_2$$

$$y = 3 \text{ if } \alpha_2 < y^* \leq \alpha_3$$

$$y = 4 \text{ if } \alpha_3 < y^* \leq \alpha_4$$

$$y = 5 \text{ if } \alpha_4 < y^*$$

Because $y^* = x\beta + e$ the choice possibilities become:

$$y = 1 \text{ if } x\beta + e \leq \alpha_1$$

$$y = 2 \text{ if } \alpha_1 < x\beta + e \leq \alpha_2$$

$$y = 3 \text{ if } \alpha_2 < x\beta + e \leq \alpha_3$$

$$y = 4 \text{ if } \alpha_3 < x\beta + e \leq \alpha_4$$

$$y = 5 \text{ if } \alpha_4 < x\beta + e$$

It is now possible to define the probability of observing each y value ($y = 1, 2, \dots, 5$). The smallest value and the largest value have expressions which are similar to the binary probit model and are defined as:

$$\begin{aligned} P(y = 1|x) &= P(x\beta + e \leq \alpha_1) \\ &= P(e \leq \alpha_1 - x\beta) \\ &= \Phi(\alpha_1 - x\beta) \\ &= 1 - \Phi(x\beta - \alpha_1) \end{aligned} \tag{6.2}$$

$$\begin{aligned} P(y = 5|x) &= P(x\beta + e > \alpha_4) \\ &= P(e > \alpha_4 - x\beta) \\ &= 1 - \Phi(\alpha_4 - x\beta) \\ &= \Phi(x\beta - \alpha_4) \end{aligned} \tag{6.3}$$

In order to identify the probability of an individual selecting a category in the middle of the choice set such as agree or disagree the formula becomes:

$$\begin{aligned}
P(y = 2|x) &= P(\alpha_1 < x\beta + e \leq \alpha_2) \\
&= P(e > \alpha_1 - x\beta, e \leq \alpha_2 - x\beta) \\
&= [1 - \Phi(\alpha_1 - x\beta) - \Phi(\alpha_2 - x\beta)] \\
&= \Phi(x\beta - \alpha_1) - \Phi(x\beta - \alpha_2) \tag{6.4}
\end{aligned}$$

This can be written as:

$$P(y = 2|x) = \Phi(\alpha_2 - x\beta) - \Phi(\alpha_1 - x\beta) \tag{6.5}$$

$$P(y = 3|x) = \Phi(\alpha_3 - x\beta) - \Phi(\alpha_2 - x\beta) \tag{6.6}$$

$$P(y = 4|x) = \Phi(\alpha_4 - x\beta) - \Phi(\alpha_3 - x\beta) \tag{6.7}$$

Interpreting the coefficients of the estimates is not as straightforward as in the OLS models as the effect of each variable on $P(y = 1, 2 \dots 5)$ is no longer linear. Interpretation requires calculation of the marginal probit effects in order to see the partial effects of a small change in a particular explanatory variable x_j on the probabilities. This is calculated for the lowest category (strongly agree) using:

$$\frac{\partial P(y = 1|x)}{\partial x_k} = -\Phi(x\beta - \alpha_1)\beta_k \tag{6.8}$$

For the highest category (strongly disagree) using:

$$\frac{\partial P(y = 5|x)}{\partial x_k} = \Phi(x\beta - \alpha_4)\beta_k \tag{6.9}$$

Finally for the intermediate categories:

$$\frac{\partial P(y = 2|x)}{\partial x_k} = [\Phi(x\beta - \alpha_1) - \Phi(x\beta - \alpha_2)]\beta_k \quad (6.10)$$

$$\frac{\partial P(y = 3|x)}{\partial x_k} = [\Phi(x\beta - \alpha_2) - \Phi(x\beta - \alpha_3)]\beta_k \quad (6.11)$$

$$\frac{\partial P(y = 4|x)}{\partial x_k} = [\Phi(x\beta - \alpha_3) - \Phi(x\beta - \alpha_4)]\beta_k \quad (6.12)$$

These calculations will be repeated for all x values to estimate the marginal effects of each x variable on the probabilities.

6.4 Results – Unconditional Differences

Differences exist both in terms of demographic characteristics and attitudes towards inequality between the 1999 respondents and 2009. Significant demographic differences (at the $p < 0.05$ level) between the two samples include, respondents from 2009 being slightly older, more likely to be male, and to have completed more years of education. Individuals from 2009 were also less likely to have as many people in their households, and were more likely to be unemployed.

Table 6.1
Unconditional Differences

| | 1999 Respondents | | 2009 Respondents | | <i>ρ</i> -value for <i>equal means</i> |
|--|---------------------|--------------|---------------------|--------------|---|
| | Mean | Std Error | Mean | Std Error | |
| Personal Characteristics | | | | | |
| Age | 47.2 | (0.493) | 46.08 | (0.61) | 0.000 |
| Male | 0.505 | (0.015) | 0.520 | (0.018) | 0.025 |
| Years of Education | 13.5 | (0.208) | 14.6 | (0.205) | 0.004 |
| Married or De facto | 0.644 | (0.015) | 0.600 | (0.019) | 0.780 |
| Number of people in HH | 3.01 | (0.047) | 3.04 | (0.055) | 0.026 |
| Unemployed | 0.215 | (0.031) | 0.420 | (0.053) | 0.001 |
| Inequality (1=Strongly Agree, 5=Strongly Disagree) | | | | | |
| Differences in income in NZ are too large | 2.124 | (0.031) | 2.355 | (0.036) | 0.000 |
| Government’s Responsibility to reduce income differences | 2.754 | (0.040) | 2.916 | (0.042) | 0.012 |
| Society (1=Type A (a lot of individuals in the bottom and few in the middle or top), 5=Type E (few people in the bottom and a lot in the top) - Appendix 2) | | | | | |
| What type of society is NZ today | 2.495 | (0.032) | 2.942 | (0.035) | 0.000 |
| What type ought it be | 3.942 | (0.024) | 4.067 | (0.029) | 0.010 |
| Individual (1=Much less, 5=Much More) | | | | | |
| Is your pay just | 2.363 | (0.025) | 2.437 | (0.030) | 0.046 |
| Opinion (1=Very Just, 5=Very Unjust) | | | | | |
| Just or unjust - higher incomes can afford better education | 3.289 | (0.042) | 2.994 | (0.043) | 0.000 |
| Just or unjust - higher incomes can afford better healthcare | 3.349 | (0.041) | 3.038 | (0.043) | 0.000 |
| Importance for Pay (1=Essential, 5=Not important at all) | | | | | |
| Number of Years spent in Education | 2.404 | (0.026) | 2.557 | (0.030) | 0.000 |
| Conflict (1=Very strong conflict, 4=No conflict) | | | | | |
| Conflict between rich and poor | 2.481 | (0.023) | 2.698 | (0.024) | 0.000 |

Notes: Sample Size: 1108 (1999), 935 (2009). Weighted standard errors in parentheses.
Data Source: ISSP surveys 1999 and 2009.

Attitudes to inequality also varied significantly across the two time periods. In response to whether individuals thought it was the Government's responsibility to reduce the differences in incomes, results showed there was a statistically significant difference between the time periods ($p < 0.05$). Respondents in 1999 were more in favour of it being the Government's responsibility to reduce differences in income whereas respondents from 2009 were on average more indifferent as to the Government's role. The survey respondents in each year were also asked if they believed differences in incomes in NZ are too large. Individuals from the 1999 sample tended to agree with this statement while 2009 individuals were more indifferent. Respondents from 2009 believed there is less inequality in society than those in 1999 based on the type of society they believed they currently lived in ($p < 0.05$). However, both 2009 and 1999 respondents have a preference towards a society with an even lower level of inequality.

When asked whether individuals considered their own pay just, there was a significant difference at a 95% confidence level with individuals in 1999 considering their pay less just than 2009 respondents. In response to the question regarding the justness of those on higher incomes being able to provide better education for their children, there was a significant difference between those in 2009 and 1999 ($p < 0.05$). Individuals in 2009 were more indifferent than those in 1999 with regard to this practice being unjust. Respondents from 2009 also felt it was more just that higher incomes can afford better healthcare than was the case for respondents from the 1999 survey.

6.5 Discussion

In terms of the demographic variables it is unsurprising that respondents from 2009 had a higher number of years of completed education, as this fits with the New Zealand trend of higher investment in human capital. Interestingly, the unemployment level was higher for the 2009 sample compared with 1999. This sample does not correspond with the trend in national recorded unemployment levels as 2009 recorded an annual level of unemployment of 6.2% compared with 7.2% in 1999 (Reserve Bank, 2012). National sample weights were included in the survey to ensure limited bias of coefficients and standard errors arose due to

sampling bias and non-response. These weights are purely for national comparison as no international weights were provided within this survey.

Interestingly, both groups thought New Zealand should have less inequality and be more representative of a society like that of type D, a society with the majority of people in the middle (Appendix 2). This result is of particular importance to this study as it shows there is a desire for more equality.

However, respondents from 2009 were more indifferent regarding the Government's role in reducing income differences and furthermore, they thought it was more just than 1999 respondents that those with a higher income could afford both better education and healthcare. This contradicts earlier predictions and suggests individuals in 2009 would be less supportive of a blanket subsidy, as those with higher incomes should reap the benefits of their children affording a better educational experience. This response is particularly relevant to this thesis as it shows individuals have a preference for higher equality. However, decomposing these attitudes shows that individuals are not concerned with inequality specifically in terms of health and education. Further, they do not believe equality should be brought about through Governmental mechanisms for redistributing income.

6.6 Results – Conditional

The statistical significant difference in average demographic characteristics across the two time periods indicates a need to condition these characteristics in case the unconditional comparisons in Table 6.1 simply reflect different sample compositions. Specifically, I will use regression analysis in order to identify if these changing average characteristics are driving the changing attitudes towards inequality.

6.7 OLS Regression

Table 6.2

OLS Regression Results

| | | Inequality | | Society | Opinion -Higher incomes can afford better | | Importance for Pay | Conflict | Individual |
|------------------------|---------------------|----------------------|-----------------------|---------------------|--|---------------------|---------------------------|---------------------|----------------------|
| | Diff in Y too large | Govt. Responsibility | Type of society today | Type ought to be | Education | Healthcare | | | |
| Year - Dummy | 0.218*** (0.05) | 0.160*** (0.06) | 0.445*** (0.05) | 0.096** (0.04) | -0.308*** (0.06) | -0.319*** (0.06) | 0.147*** (0.04) | 0.219*** (0.03) | 0.100** (0.04) |
| Age | -0.007*** (0.00) | -0.004** (0.00) | -0.006*** (0.00) | -0.009*** (0.00) | -0.004* (0.00) | 0 (0.00) | -0.006*** (0.00) | -0.002 (0.00) | 0.001 (0.00) |
| Male | -0.196*** (0.05) | -0.159*** (0.06) | -0.105** (0.05) | 0.039 (0.04) | 0.097 (0.06) | 0.154** (0.06) | -0.180*** (0.04) | -0.123*** (0.03) | -0.047 (0.04) |
| Years in Education | 0.010* (0.01) | 0.006 (0.01) | 0.007 (0.01) | 0.005 (0.01) | 0 (0.01) | -0.001 (0.01) | -0.006 (0.00) | 0.001 (0.00) | -0.007** (0.00) |
| Married or De Facto | 0.047 (0.05) | 0.163** (0.06) | 0.165*** (0.05) | 0.040 (0.04) | 0.045 (0.07) | 0 (0.07) | 0.068 (0.04) | 0.080** (0.04) | 0.085** (0.04) |
| Number of People in HH | -0.028 (0.02) | -0.076*** (0.02) | -0.035* (0.02) | -0.011 (0.02) | -0.062** (0.03) | -0.043* (0.02) | -0.023 (0.02) | -0.028** (0.01) | -0.022 (0.02) |
| Unemployed | -0.035* (0.02) | -0.123*** (0.02) | -0.054** (0.03) | -0.029* (0.02) | -0.00 (0.03) | 0.002 (0.03) | -0.038** (0.02) | -0.056*** (0.02) | -0.071 *** (0.02) |
| Constant | 2.507*** (0.14) | 3.119*** (0.18) | 2.758*** (0.15) | 4.289*** (0.13) | 3.611*** (0.19) | 3.459*** (0.19) | 2.889*** (0.12) | 2.664*** (0.10) | 2.468*** (0.11) |

Notes: Sample has N=2043 observations. Weighted standard errors in parentheses.

***significant at 1%

** significant at 5%.

* significant at 10%.

Source: ISSP data surveys 1999 and 2009.

Decomposing the respondents' attitudes toward inequality into demographic components shows there are marked differences across the two time periods. The coefficient for the dummy variable which represents the time period is significant across all aspects of inequality queried. This is unsurprising as it supports the earlier results. Table 6.3 summarizes the significant demographic factors associated with strong agreement to the following inequality statements.

Table 6.3

OLS Regression Results – Demographic Factors

| | Year - Dummy | Age | Male | Years in Education | Married or De Facto | Number of People in HH | Unemployed |
|--|-----------------|-----|------|-----------------------|------------------------|---------------------------|------------|
| Differences in Y are too large | ● | ● | ● | ● | | | ● |
| Govt. Responsibility to reduce differences in Y | ● | ● | ● | | ● | ● | ● |
| <i>Inequality</i> | | | | | | | |
| Type of society today | ● | ● | ● | | ● | ● | ● |
| Type ought to be | ● | ● | | | | | ● |
| <i>Opinion -Higher incomes can afford better</i> | | | | | | | |
| -Education | ● | ● | | | | ● | |
| -Healthcare | ● | | ● | | | ● | |
| Educations importance for pay | ● | | ● | | ● | ● | ● |
| Conflict exist between rich and poor | ● | | ● | | ● | ● | ● |
| Own pay is just | ● | | | ● | ● | | ● |

Notes: ●=significance at any level above 10%

Source: ISSP data surveys 1999 and 2009.

Results from the OLS regression highlight a significant difference exists between individuals in 2009 and 1999. The year dummy variable is statistically significant ($p < 0.05$) across all nine questions relating to inequality. Individuals in 2009 were more likely to disagree with the statements:

- Differences in income are too large
- It is the Governments responsibility to reduce differences in income
- The type of society we live in today should be one with a small elite at the top, very few people in the middle and the great mass of people at the bottom
- We ought to live in a society with the aforementioned characteristics
- Education is important for pay
- There exists conflicts between rich and poor individuals
- Their own individual pay is just

While agree with:

- Those on higher incomes should be able to afford better education and health

This suggests individuals in 2009 may react differently to individuals in 1999 regarding public policies which involve inequality. This next section will look at demographic effects which may also be creating differences in opinion within each year.

When asked the question “Are differences in income too large?” age and gender were significant variables with males and older individuals being more likely to agree with this statement. Both years of education and being unemployed were only weakly significant ($p < .10$). Those who were unemployed were more likely to agree that differences in income are too large whereas, more years of education made an individual more likely to disagree.

In terms of whether the individual thought it was the Government’s responsibility to reduce differences in income, age was associated with agreement ($p < 0.05$). Being unemployed, male and the number of people in the household were all highly significant ($p < 0.01$) and more likely to agree with it being the Government’s responsibility. Being married or de facto was significant ($p < 0.05$)

and was more likely to make an individual disagree with it being the Government's responsibility.

When asked what type of society the individual believed they lived in today individuals who were married or de facto were more likely to believe they lived in a more equal society ($p<0.01$). The individual's age was highly significant ($p<0.01$) as well as whether they were unemployed or male ($p<0.05$) and had more people in their household ($p<0.10$). All of the respondents in these categories were more likely to believe they currently lived in a more unequal society.

As a follow up question individuals were asked what type of society they believed it ought to be. Age was statistically significant, with older people more likely to say it ought to be more unequal, characterised by a few people at the top and the majority of people at the bottom. Whether or not an individual was unemployed was also significant ($p<0.10$) and unusually, also more likely to say it ought to be more unequal.

When asked whether respondents thought their own pay was just, individuals who were unemployed were less likely to agree with their own pay being just, ($p<0.01$) as well as, having more years of education ($p<0.05$). Being married or de facto increased the likelihood of agreeing ($p<0.05$) that the respondent would believe their own pay was just.

The questions "should those on higher incomes be able to afford better education?" and separately in terms of healthcare were also posed to respondents. Having a higher number of people in the household was significantly related to both these statements and associated with disagreement. Age was also associated with disagreement when asked specifically about education ($p<0.10$) while being male was associated with agreement when asked solely about healthcare ($p<0.05$).

Individuals were also asked whether they believed the number of years spent in education was important for pay. Individuals who were older or male were more likely to agree with this statement ($p<0.01$) as well as individuals who were unemployed ($p<0.05$).

Finally, individuals were asked if they thought there was strong or no conflicts between those who are rich and those who are poor. Males and unemployed

individuals were more likely to think no conflicts exist at a statistically significant level ($p<0.01$) along with those who have a large number of people in their household ($p<0.05$). Individuals who were married or de facto were more likely to agree that there are strong conflicts between rich and poor ($p<0.05$).

6.8 Ordered Probit

Table 6.4

Ordered Probit Results

| | Inequality | | Society | | Opinion -Higher incomes can afford better | | Importance for Pay | Conflict | Individual |
|------------------------|---------------------|----------------------|-----------------------|-------------------|--|---------------------|---------------------------|---------------------|-------------------|
| | Diff in Y too large | Govt. Responsibility | Type of society today | Type ought to be | Education | Healthcare | | | |
| Year - Dummy | 0.243*** (0.05) | 0.146** (0.05) | 0.469*** (0.05) | 0.135** (0.06) | -0.250*** (0.05) | -0.264*** (0.05) | 0.208*** (0.05) | 0.346*** (0.05) | 0.133** 0.05 |
| Age | -0.007*** (0) | -0.004** (0) | -0.006*** (0) | -0.012*** (0) | -0.004** (0) | -0.001 (0) | -0.009*** (0) | -0.002 (0) | 0.001 0 |
| Male | -0.196*** (0.05) | -0.131** (0.05) | -0.102* (0.05) | 0.033 (0.06) | 0.072 (0.05) | 0.125** (0.05) | -0.257*** (0.05) | -0.193*** (0.05) | -0.063 0.05 |
| Years in Education | 0.010* (0) | 0.006 (0) | 0.007 (0) | 0.007 (0) | 0 (0.01) | -0.001 (0.01) | -0.006 (0) | 0.002 (0) | -0.010* -0.01 |
| Married or De Facto | 0.040 (0.06) | 0.129** (0.06) | 0.168*** (0.05) | 0.035 (0.06) | 0.026 (0.05) | -0.007 (0.05) | 0.114 (0.05) | 0.117** (0.06) | 0.111** 0.06 |
| Number of People in HH | -0.031 (0.02) | -0.065*** (0.02) | -0.036* (0.02) | -0.003 (0.02) | -0.054** (0.02) | -0.037* (0.02) | -0.039 (0.02) | -0.042** (0.02) | -0.029 0.02 |
| Unemployed | -0.040* (0.02) | -111*** (0.02) | -0.051* (0.03) | -0.043* (0.02) | -0.004 (0.02) | -0.005 (0.02) | -0.039* (0.02) | -0.088*** (0.03) | -0.095*** 0.03 |

Notes: Sample has N=2043 observations. Weighted standard errors in parentheses. The ordered probit coefficients show the effect of the independent variable on a linear index.

***significant at 1%

** significant at 5%.

* significant at 10%.

Source: ISSP data surveys 1999 and 2009.

6.9 Marginal Effects – Strongly Agree

Interpretation of the above ordered Probit model requires calculation of marginal effects. The results included below are the probability individuals strongly agreed with each of the statements using equation 6.8.

The ordinal nature of these data enables analysis for any of the categories such as agree, disagree etc, but just one has been selected one for simplicity. Table 6.5 summarizes the significant demographic factors associated positively or negatively with strong agreement to the following inequality statements.

Table 6.5

Probit Results - Strongly Agree

| | Year - Dummy | Age | Male | Years in Education | Married or De Facto | Number of People in HH | Unemployed |
|--|-----------------|-----|------|-----------------------|------------------------|---------------------------|------------|
| Diff in Y too large | ○ | ● | ● | ● | | | ● |
| Govt. Responsibility to reduce differences in Y | ○ | ● | ● | | ○ | ● | ● |
| <i>Inequality</i> | | | | | | | |
| Type of society today | ○ | ● | ● | | ○ | ● | ● |
| Type ought to be | ○ | ● | | | | | |
| <i>Opinion -Higher incomes can afford better</i> | | | | | | | |
| Education | ● | ● | | | | ● | |
| Healthcare | ● | | ○ | | | ● | |
| Educations importance for pay | ○ | ● | ● | | | | ● |
| Conflict exist between rich and poor | ○ | | ● | | ○ | ● | ● |
| Own pay is just | ○ | | | ● | ○ | | ● |

Notes: ●=significance at any level above 10% which was positively associated with strong agreement.

○=significance at any level above 10% which was negatively associated with strong agreement.

Source: ISSP data surveys 1999 and 2009.

Results from the probit analysis reveal the year dummy variable is significantly associated (at a 95% confidence level) both positively and negatively to strong agreement to all of the questions asked about inequality. This suggests there is a significant difference between attitudes in 1999 and 2009. Individuals in 2009 were less likely to strongly agree with the following statements:

- Differences in income are too large
- It is the Governments responsibility to reduce differences in income
- The type of society we live in today should be one with a small elite at the top, very few people in the middle and the great mass of people at the bottom
- We ought to live in a society with the aforementioned characteristics
- Education is important for pay
- There exists conflicts between rich and poor individuals
- Their own individual pay is just

While they were more likely to strong agree that:

- Those on higher incomes should be able to afford better education and health

This suggests individuals in 2009 are less likely to regard education as an important factor influencing pay and that Governments should not intervene in order to reduce the differences that currently exist in incomes. Further, they believe those on higher incomes should be able to afford better education than those on lower incomes. This suggests individuals in 2009 may be less likely to support the large subsidisation of tertiary education that exists through the introduction of zero interest in the student loan market.

These differences between 1999 and 2009 may be driven by demographic differences in the 2009 sample. The next section will examine to what extent these demographic factors such as age and ethnicity are influencing these attitudes.

6.9.1 Demographic differences – strongly agree

With each additional year of age the likelihood of an individual strongly agreeing with the statement “Are differences in income are too large” increases by 0.2 percentage points. Males are 6.1 percentage points more likely to strongly agree with this statement compared to women, and those who are unemployed are more likely by 1.3 percentage points, while the more years spent in education reduces the likelihood of agreeing with this statement by 0.3 percentage points.

When asked whether respondents thought it was the Government’s responsibility to reduce differences in income, each additional year of age increased the likelihood they would strongly agree with this statement by 0.1 percentage points. Being male, unemployed or having more people in your household all increased the probability by 3.1, 2.6 and 1.5 percentage points respectively. The only factor which decreased the likelihood of agreement was being married or de facto which decreased the probability by 3.0 percentage points.

Each additional year of age made respondents 0.1 percentage points more likely to rate the society they live in today as one with a small elite at the top, a few in the middle and a large amount at the bottom. Those who were unemployed were also 1.0 percentage points more likely to agree with this type as well as males who were 2.1 percentage points more likely. However, being married or de facto made individuals 3.4 percentage points more likely to disagree that they live in this type of society. When asked what type of society they thought they ought to live in only age was significant however, with a margin effect of less than 0.1 percentage points.

In response to the question “Do you think it is a just practice that those with a higher income can afford a better education?”, the number of people in the household and the individual’s age both made a significant difference at the margin. As the number of people in the household or age increased this was associated with strong agreement with this statement by 1.1 and 0.1 percentage points respectively. When asked the same question but with regard to healthcare being male was associated with disagreement by 2.5 percentage points.

Participants were asked how essential they thought education was in terms of determining pay. Whether the individual was male, older or unemployed were all

characteristics associated with believing education is essential (4.4, 0.2 and 0.9 percentage points respectively).

Being unemployed or having more years in education made individuals more likely to think their pay is much less than is just by 2.1 and 0.2 percentage points respectively. Being married made the individuals more likely to disagree with this statement by 2.4 percentage points.

Being male, unemployed or having more people in the household were all more likely to be associated with thinking there exists strong conflicts between the rich and poor (2.6, 1.2 and .6 percentage points respectively), while being married or de facto made individuals less likely to believe strong conflicts exist by 1.6 percentage points.

These results suggest demographic differences may in fact be driving some of the differences in attitudes. Individuals who were older, unemployed or male were significant demographic factors in two thirds of the questions regarding inequality, while being married or de facto and the number of people in the household were significant in just over half of the questions. Finally, the number of years an individual spent in education was the least significant variable and only affected two of the nine questions asked.

6.10 Marginal Effects – Strongly Disagree

Table 6.6

Probit Results - Strongly Disagree

| | Year - Dummy | Age | Male | Years in Education | Married or De Facto | Number of People in HH | Unemployed |
|--|-----------------|-----|------|-----------------------|------------------------|---------------------------|------------|
| Diff in Y too large | ● | ○ | ○ | ● | | | ○ |
| Govt. Responsibility to reduce differences in Y | ● | ○ | ○ | | ● | ○ | ○ |
| <i>Inequality</i> | | | | | | | |
| Type of society today | ● | ○ | ○ | | ● | ○ | ○ |
| Type ought to be | ● | ○ | | | | | ○ |
| <i>Opinion -Higher incomes can afford better</i> | | | | | | | |
| Education | ○ | ○ | | | | ○ | |
| Healthcare | ○ | | ● | | | ○ | |
| | | | | | | | |
| Educations importance for pay | ● | ○ | ○ | | | | ○ |
| Conflict exist between rich and poor | ● | | ○ | | ● | ○ | ○ |
| Own pay is just | ● | | | ○ | ● | | ○ |

Notes: ●=significance at any level above 10% which was positively associated with strong disagreement.

○=significance at any level above 10% which was negatively associated with strong disagreement.

Source: ISSP data surveys 1999 and 2009.

Re-estimating the marginal effects at the opposite end of the Likert scale can identify if any specific characteristics were associated with strong disagreement with the above inequality based statements using equation 6.9.

Comparing strong disagreement with strong agreement can identify if any factors which were associated negatively with strong agreement were in fact because it was associated positively with strong disagreement, rather than indifference. Table 6.6 summarizes the significant demographic factors associated positively or negatively with strong agreement to the following inequality statements.

The dummy variable representing the difference between the 1999 and 2009 respondents was significant for all the questions regarding inequality at a 95% confidence level. This shows that individuals in 2009 were more likely to strongly disagree with the following statements:

- Differences in income are too large
- It is the Government's responsibility to reduce differences in income
- The type of society we live in today should be one with a small elite at the top, very few people in the middle and the great mass of people at the bottom
- We ought to live in a society with a small elite at the top, very few people in the middle and the great mass of people at the bottom
- Education is important for pay
- There exists conflicts between rich and poor individuals
- Their own individual pay is just

And less likely to strongly disagree that:

- Those on higher incomes should be able to afford better education and health

These results confirm that the attitudes of individuals in 2009 were less likely to support the introduction of the blanket subsidy on student loans in 2006. It is also interesting to identify if any demographic factors are more likely to influence an individual's decision to strongly disagree with the aforementioned inequality statements. Significant demographic differences associated with each statement are presented in the next section.

6.10.1. Demographic differences – strongly disagree

When respondents were asked if they believed differences in incomes were too large at present, individuals who were male or unemployed were less likely to strongly disagree with this statement by 0.8 and 0.2 percentage points respectively. While being married or de facto made an individual more likely to strongly agree by 0.2 percentage points.

In response to the question “is it the Government’s responsibility to reduce differences in income?”, being male, unemployed or having more people in the household were less likely to strongly disagree with this responsibility by 2.2, 2.0 and 1 percentage points respectively while being married increased the likelihood of strongly disagreeing with this statement by 1 percentage point.

Respondents were asked what type of society they believed they lived in today based on a range of 5 indices. Individuals who were older, unemployed, or male were less likely to strongly disagree that they live in a society where there are many people at the top and only a few at the bottom by 0.2, 0.2 and 0.3 percentage points respectively, while being married made an individual more likely to strong disagree by 0.5 percentage points. When asked what society they thought it ought to live in, being male made the individual 1 percentage point more likely to want this type of society while being unemployed made individuals more likely by 1 percentage point not to want this type of society.

When asked if those on higher incomes should be able to afford better education older individuals and individuals with a higher number of people in their household were less likely to strongly disagree with this statement by 1 percentage point. A similar question asked individuals if they believed those on higher incomes should be able to afford better healthcare. Results showed that being male decreased the likelihood of strongly disagreeing by 2 percentage points and being unemployed or having a higher number of people in the household also decreased the likelihood by 1 percentage point while being married increased the likelihood by 1 percentage point.

When individuals were asked if they believed that no strong conflicts existed in society, being male or unemployed decreased the likelihood of strong

disagreement by 2 and 1 percentage points respectively. Being married increased the likelihood of strong disagreement by 1 percentage point.

None of the aforementioned characteristics played a role in increasing the likelihood of strongly disagreeing that education is important for pay, or in terms of agreeing that their own personal pay is much more than is just to a significant effect. Interestingly, only 0.5% and 0.8% of individuals respectively in this survey voted for these options which suggests the majority of the sample believe education is important in determining pay and they do not strongly disagree that their pay is much more than just.

The demographic factors associated with strong disagreement were very similar, but in different directions to those associated with strong agreement. This is not surprising as it simply eliminates the possibility that individuals were indifferent to the statement rather than holding the opposing view. There was one exception to this with unemployed individuals being more likely not to want to live in a society with many people near the top, and only a few near the bottom. Yet they were not significantly associated with wanting an oppositely distributed society where a small number of elite are at the top, very few people in the middle, and the great mass of people at the bottom.

6.11 Decomposing Effects

These significant demographic effects can be decomposed further to identify if certain types within each of the demographic variables are driving the significant result. For example, education was a significant variable in two of the nine questions asked and it is possible to identify if individuals with similar educational attainment are driving this significance. Both education and age will be decomposed in the following section.

6.11.1 Education

Education was a demographic variable which appeared to play a significant role when individuals were asked if they believed differences in incomes were too large and if they believed their own pay was just. Education was decomposed into

six categories ($y = 1, 2, \dots, 6$): no formal qualification, lowest formal qualification (NCEA level 1), above lowest qualification (NCEA level 2), higher secondary qualification (NCEA level 3), above secondary qualification (trade and vocational training) and university qualifications. An ordered probit and marginal effects model was then used to identify if any type of education was driving the significant result.

Results showed that when individuals were asked if they believed differences in income were too large it was those who either had the lowest formal education ($y = 2$) or just above this qualification ($y = 3$) that were more likely to strongly agree with this statement. Having an education equivalent to this in 1999 made the respondents more than 16 percentage points more likely to strongly agree differences in income are too large. Education was also a significant variable in terms of whether individuals believed their own pay was just. However, this significance appears not to be driven by a specific group of individuals with similar qualifications.

6.11.2 Age

The analysis above also highlighted that age is likely to play a role in defining whether an individual is likely to strongly agree with a statement regarding inequality. Excluding the inequality questions regarding health, conflict, and whether or not they believed their own pay was just, age significantly affected the remaining questions regarding inequality. These effects were also decomposed using an ordered probit model and marginal effects calculations. Age was split into 8 categories ($y = 1, 2, \dots, 8$).

Results revealed age was a significant characteristic when individuals were asked if, in their opinion, they strongly agreed differences in income are too large. Decomposing this shows this significance is primarily coming from those aged 35 to 44 ($y = 4$) in 1999. The age interval up to 17 was omitted for both groups as no participants meet this criterion, while the interval 75 to 98 was omitted to avoid multicollinearity effects.

Surprisingly, the marginal probit results show those aged 35 to 44 in 1999 were actually 11.9 percentage points more likely to not strongly agree that differences in income are too large. This contradicts the marginal effect above which had a positive marginal value prior to age being split into intervals.

Interestingly, age was a significant variable when individuals were asked if they believed it was the Government's responsibility to reduce differences in income, however when split into age intervals only the age group 35 to 44 years old ($y = 4$) was significant at a 90% confidence interval. When individuals were asked what type of society they believed they lived in today, no specific age interval is driving the previous significant results. Quite a different story is evident when individuals were asked what type of society they thought they ought to live in. All ages from 18 to 64 ($y = 1, 2, 3, 4$ & 5) were highly significant in 1999 ($p < 0.01$) whereas, only one age group (55-64, $y = 5$) was significant in 2009, and then only slightly ($p < 0.10$).

6.12 Conclusions

Attitudes towards inequality in New Zealand have significantly changed between 1999 and 2009. One particularly interesting result is that individuals in 2009 are more likely to disagree that it is the government's responsibility to intervene in order to reduce differences in income. Further, individuals in 2009 were also more likely to agree that those on a higher income should be able to afford better education. These types of results do not support the profound subsidisation of tertiary education through the blanket subsidy on interest which was introduced in 2006.

Individuals' in 2009 did however, still desire a society with less inequality, or a society characterised by a larger proportion of individuals in the middle or top of the distribution, and less in the bottom. This result was also true of individuals' in 1999, and suggests that individuals in both 1999 and 2009 are likely to support policies which are aimed at reducing inequality. Opinions regarding the current state of inequality present in society revealed individuals in 2009 believed they lived in a society with greater equality than those in 1999.

Demographic differences in 1999 and 2009 also played a significant role in individuals' attitudes towards questions regarding inequality. Individuals who were older, unemployed, male, or who had higher numbers of people in their household were all factors which were positively associated with strong agreement to the above statements. This suggests individuals with these characteristics are the most likely to support policies ratifying inequality and believe education is important in determining an individual's pay.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The surprising decision from the Labour Government in 2006, to eliminate all interest from student loans, for borrowers choosing to reside in New Zealand, was controversial. It was the first time a government had moved from a full market interest rate to a zero nominal rate of interest on student loans. Investigation into the potential impacts of this type of policy had previously been restricted to theoretical research, which predicted that the consequent non-price rationing of scarce educational resources, and the income-contingent repayments structure would benefit wealthier borrowers over time, exacerbating inequality.

This thesis offered the first chance to reconcile theory with empirics by examining changes in the student loan scheme policy, with a particular focus on interest rates. These results have been placed against a background of changing public attitude to inequality, and provided some evidence on possible consequences for beneficiaries. Within this chapter a brief conclusion from Chapters 5 and 6 will be presented before summarising the limitations and highlighting areas for future research.

7.2 Distributional Impacts

Income data collected from the NZIS was used to examine general trends in inequality from 2002-2007. This analysis neither revealed evidence, across a range of income and inequality measures, in full support of theoretical predictions,

nor did this analysis substantiate the Labour Government's predictions of greater equality convincing. A large variation in inequality measures occurred, which suggests that further investigation is warranted.

The subgroup of likely student loan holders had higher recorded weekly income values on average when compared to the total population, which suggests the private returns to education are significant. Further, results from propensity score and Kernel matching techniques indicated individuals who were likely student loan holders were already characteristically more likely to earn more later in their working lifetime. These results show that paying a significant subsidy towards this group may in fact be inefficient.

7.3 Attitudes

Evidence from the studying of attitudes towards inequality from 1999 and 2009 showed a significant change has occurred within this timeframe. Individuals in 2009 were more likely to disagree that it is the government's responsibility to intervene in order to reduce differences in income, and agree that those on a higher income should be able to afford better education. These results do not correspond with the high level of subsidisation associated with the zero interest policy on student loans introduced in 2006.

In addition to comparing opinions across the two years, demographic characteristics that are associated with supporting government intervention and placing greater importance on education were investigated. Interestingly, these characteristics included being male, older, or unemployed, which are not characteristics associated with being a student loan holder. This suggests reducing educational inequality is not an issue solely concerning individuals who are, in fact, loan holders.

7.4 Future Research

This thesis provides general conclusions regarding inequality, incomes, and attitudes, for both the total population and a subgroup of likely student loan holders, before and after the introduction of the blanket interest subsidy on student loans in 2006. More specific conclusions, particularly the explicit testing of the theoretical predictions of introducing a blanket interest subsidy, require more specialised data.

Literature theorising on the implications of introducing a blanket interest subsidy attribute a potential increase in inequality to two factors. Firstly, the consequent non-price rationing of scarce educational resources and, secondly, in the case of income-contingent repayments, the benefit accrues to wealthier borrowers. Optimal testing of the implications of adopting a non-price rationing enrolment system would employ enrolment data, while up-to-date longitudinal data would be most appropriate for investigating the potential impacts of an income-contingent repayment scheme. These present gaps for future research to exploit.

Additionally, future studies incorporating a longer time frame could extend this research by identifying more recent trends, and changes to borrower's behaviour, over the entire seven years since the policy's implementation. This would also allow investigation into trends which have occurred for borrowers who started borrowing post 2006 and whose loans have never borne a market rate of interest.

This thesis is the inaugural empirical investigation into the removal of interest on student loans, a policy with potentially profound and wide-reaching implications for inequality. This policy has been implemented for several years and yet we know little of its effects. As outlined above, there are several areas in which future study can contribute to our understanding.

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APPENDICES

Appendix 1 - Likert Scale

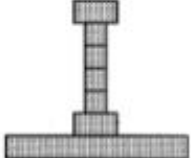
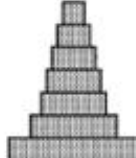

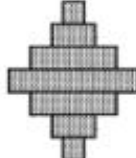
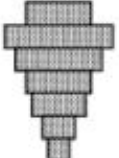
- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree
- 8 Can't choose
- 9 No answer

(Any answer of 8 or 9 was excluded from descriptive statistics)

Appendix 2 - Inequality Scale

Mean response of participants to the question: "What do you think New Zealand ought to be like – which would you prefer?"

- 1: Type A: A small elite at the top, very few people in the middle and the great mass of people at the bottom.
- 2: Type B: A society like a pyramid with a small elite at the top, more people in the middle and the most at the bottom.
- 3: Type C: A pyramid except that just a few people are at the bottom.
- 4: Type D: A society with most people in the middle.
- 5: Type E: Many people near the top, and only a few near the bottom.

| | | | | |
|---|--|---|--|---|
|  |  |  |  |  |
| Type A | Type B | Type C | Type D | Type E |
| A small elite at the top, very few people in the middle and the great mass of people at the bottom. | A society like a pyramid with a small elite at the top, more people in the middle, and most at the bottom. | A pyramid except that just a few people are at the bottom. | A society with most people in the middle. | Many people near the top, and only a few near the bottom. |

Appendix 3 - Demographic Questions

Mean response of participants to the question: “Just or unjust – that people with higher incomes can buy better health care than people with lower incomes?”

- 1 Very just, definitely right
- 2 Somewhat just, right
- 3 Neither just nor unjust, mixed feelings
- 4 Somewhat unjust, wrong
- 5 Very unjust, definitely wrong
- 8 Can't choose
- 9 No answer

Appendix 4 – Difference in Means

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|--|-----------------------------|---|------|------------------------------|----------|-----------------|-----------------|-----------------------|---|-------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Differences in income are too large | Equal variances assumed | 3.562 | .059 | -4.043 | 1973 | .000 | -.185 | .046 | -.274 | -.095 |
| | Equal variances not assumed | | | -4.045 | 1923.990 | | | | | |
| It is the responsibility of the government to reduce the differences in income between people with high incomes and | Equal variances assumed | 23.283 | .000 | -2.507 | 1943 | .012 | -.142 | .057 | -.254 | -.031 |
| | Equal variances not assumed | | | -2.523 | 1934.787 | | | | | |
| Type of society: What type of society is New Zealand today - which diagram comes closest? | Equal variances assumed | 8.226 | .004 | -8.889 | 1967 | .000 | -.411 | .046 | -.502 | -.320 |
| | Equal variances not assumed | | | -8.929 | 1949.384 | | | | | |
| Type of society: What do you think New Zealand ought to be like - which would you prefer? | Equal variances assumed | .011 | .916 | -2.572 | 1953 | .010 | -.093 | .036 | -.164 | -.022 |
| | Equal variances not assumed | | | -2.566 | 1879.952 | | | | | |
| Just or unjust - that people with higher incomes can buy better education for children than people with lower income | Equal variances assumed | 67.701 | .000 | 5.016 | 1974 | .000 | .295 | .059 | .179 | .410 |
| | Equal variances not assumed | | | 5.085 | 1973.779 | | | | | |
| Just or unjust - that people with higher incomes can buy better health care than people with lower incomes? | Equal variances assumed | 48.521 | .000 | 5.081 | 1976 | .000 | .294 | .058 | .181 | .408 |
| | Equal variances not assumed | | | 5.137 | 1972.643 | | | | | |
| Conflicts: between poor people and rich people? | Equal variances assumed | 23.523 | .000 | -6.458 | 1939 | .000 | -.211 | .033 | -.275 | -.147 |
| | Equal variances not assumed | | | -6.495 | 1918.777 | | | | | |
| Important for pay: the number of years spent in education and training? | Equal variances assumed | 3.232 | .072 | -3.761 | 1994 | .000 | -.139 | .037 | -.211 | -.066 |
| | Equal variances not assumed | | | -3.778 | 1970.383 | | | | | |
| Is your pay just? | Equal variances assumed | 4.306 | .038 | -1.993 | 1876 | .046 | -.076 | .038 | -.150 | -.001 |
| | Equal variances not assumed | | | -1.984 | 1793.240 | | | | | |

Appendix 5 - Student Loan Characteristic Coefficients

| | | | | | | |
|---|------------|-----------|------------|------------------------|----------------------|-----------|
| Trinh's Regression Log Files | | | | | | |
| . reg has_sloan female i.ethnic i.edu age age2 if wave==8 & age>=25 & age<=45 | | | | | | |
| Source | SS | df | MS | Number of obs = 3688 | | |
| Model | 40.1917582 | 10 | 4.01917582 | Prob > F | = 0.0000 | |
| Residual | 369.165888 | 3677 | .100398664 | R-squared | = 0.0982 | |
| -----+ | | | | Adj R-squared = 0.0957 | | |
| Total | 409.357646 | 3687 | .111027298 | Root MSE | = .31686 | |
| ----- | | | | | | |
| has_sloan | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
| -----+ | | | | | | |
| female | .0702225 | .0106096 | 6.62 | 0.000 | .0494211 | .0910239 |
| ethnic | | | | | | |
| 2 | .1055976 | .0175265 | 6.03 | 0.000 | .0712349 | .1399603 |
| 3 | .0483098 | .0268691 | 1.80 | 0.072 | -.0043701 | .1009897 |
| 4 | .0248926 | .0233859 | 1.06 | 0.287 | -.0209579 | .0707432 |
| 5 | .0295667 | .0452681 | 0.65 | 0.514 | -.0591864 | .1183198 |
| edu | | | | | | |
| 2 | .0027571 | .0187992 | 0.15 | 0.883 | -.0341007 | .039615 |
| 3 | .0712893 | .0177484 | 4.02 | 0.000 | .0364917 | .1060869 |
| 4 | .1630313 | .0192489 | 8.47 | 0.000 | .1252917 | .2007709 |
| age | -.1202466 | .0246842 | -4.87 | 0.000 | -.1686427 | -.0718505 |
| age2 | .0013733 | .000321 | 4.28 | 0.000 | .000744 | .0020025 |
| _cons | 2.582722 | .4708684 | 5.49 | 0.000 | 1.659533 | 3.505911 |
| ----- | | | | | | |

Appendix 6 – Percentage of Population with Student Loans

| Year | % of Pop w SL |
|------|---------------|
| 2002 | 9.13% |
| 2003 | 9.68% |
| 2004 | 10.24% |
| 2005 | 10.76% |
| 2006 | 11.24% |
| 2007 | 11.79% |

Appendix 7 – CDF Functions (2002-2007)

