Who Benefits from Increases to Government Allowances? Evaluating the Impact of a Policy Change in New Zealand.

* * *

A research thesis in partial fulfillment of the requirements for the degree of Master of Business Studies - Economics

At Massey University, Palmerston North,
New Zealand

* * *

Diana Russell
August 2020

Abstract

This thesis investigates a natural experiment created by a 2018 policy change to New Zealand's Student Loan Living Costs, Student Allowance and Accommodation Benefit to estimate whether this policy has raised rents. Using data sourced from Statistics New Zealand, I estimate that the average support students received in the one year following the policy change increased on average $66 per week and find a positive effect on weekly rents in Palmerston North, Wellington, and Dunedin. This paper also finds a significant announcement effect for the one year following the policy's announcement on 21 November 2017. The policy effect was concentrated in Wellington, and I find a large significant positive effect in 5+ bedroom dwellings across all three cities. The results estimate that the marginal propensity to spend on housing is about 0.33 and elasticity of housing expenditure with respect to income about 0.14. Overall, the results suggest that recipients benefited between 63-100% of the increase in weekly payments in the form of higher disposable income after housing costs.

Acknowledgments

I would first like to thank my supervisors Dr. Syed Hasan and Dr. Shamim Shakur for your advice and guidance throughout, as well as the Research coordinators Fong Mee Chin and Ha-Lien Ton. Thank you for the extra support and understanding in light of the disruptions brought on by the COVID-19 lock-downs. My supervisors and the course coordinators at Massey University have made what could have been a difficult situation very easy and straightforward.

I want to acknowledge and thank the many analysts at Statistics New Zealand's Customer Liaison Team, and Wellington Data Lab, for answering my many questions and processing the outputs. I would also like to acknowledge the Ministry of Business, Innovation and Employment, Ministry of Social Development, Ministry of Education for the data they have provided.

I would also like to thank Dr. Amanda Eng for your help navigating the Statistics New Zealand data lab, showing me around the IDI and wiki, as well as your advice and guidance with importing the data tables from SQL to SAS.

List of Tables

List of Figures

1. Aim/ Introduction

A common concern with demand-side housing subsidies to low-income tenants is the extent to which payments are absorbed by landlords in the form of higher rents. This paper studies an increase to weekly cash subsidies provided to Tertiary Students in New Zealand to help combat the rising cost of living. In order to understand the efficiency of such policies, this paper estimates to what extent the increased subsidy passed on to landlords and to what extent it increased recipients living standards in the form of higher disposable income net-of-housing-costs.

In this paper, I exploit a natural experiment created by a 2018 policy change to New Zealand's student support scheme — Student Loan Living Costs (LC), Student Allowance (SA) and Accommodation Benefit (AB) — to examine the impact of an increase in the value of a housing allowance on rents. As of 01 January 2018, the maximum entitlement increased by $70 per week; and we estimate that the average increase in weekly support that students received, following the policy taking effect, was $66 per week, a 29.5% increase[1].

The central aim of this paper seeks to estimate to what extent did the increase in weekly student benefits increase rents. The results will also allow us to make observations about the implied income elasticity of demand for low-income housing in the tertiary student rental market and estimates of the marginal propensity to spend on rent in relation to income.

To estimate the policy's effect on mean student rents, this paper uses regression adjusted difference-in-difference (DiD) methods to analyse Student loans and allowances data from *StudyLink, Tertiary Education Data,* and *Tenancy Bond Data*, provided by the Ministry of Social Development, the Ministry of Education and the Ministry of Business, Innovation and Employment, respectively, and accessed via Statistics New Zealand's integrated data infrastructure.

Whether we find positive, negative or no effect on mean rents as a result of the policy change, this information will be useful to policy makers when assessing the effectiveness and efficiency of similar policies in the future. Currently, the literature on tertiary student housing markets is very limited.

1 The average total amount of LC, SA and AB received by students in 2017, across Palmerston North, Wellington and Dunedin, was around $224.28 per week, which increased on average $66 per week representing a 29.5% increase.

The paper proceeds as follows. In Section 2, we provide an overview of the StudyLink Student support scheme in New Zealand and outline the 2018 policy change that we investigate using the difference-in-difference econometric methodology. Section 3, provides an extensive literature review on the impacts of demand-side housing subsidies on rent, living standards and other social benefits; alongside a review of the difference-in-difference design. Section 4 states the central hypothesis. Section 5 and 6 describe, respectively, the administrative data, and the methodology adopted to analyse the policy impact. Section 7 then presents the results, a brief discussion of the interpretation, followed by concluding remarks.

2. The StudyLink Student Support Scheme in New Zealand

The Student Support Scheme[2] is administrated by StudyLink, a division of the Ministry of Social Development. Under the scheme, tertiary students studying an approved course[3] are entitled to receive financial support for housing and living costs through either the Students Loan Living Costs *or* the Student Allowance[4]/Accommodation Benefit scheme.

A Student Allowance and the Student Loan Living Costs are a weekly cash payment designed to help with living expenses while studying. The main difference between the Student Allowance and the Student Loan Living costs is that students who are eligible[5] for the Allowance, don't have to pay the it back, however, students do have to pay back the living costs, as it's part of the Student Loan. If a Student Allowance is approved their living costs will be reduced by the amount of Student Allowance you get. For example, the maximum weekly living costs payments, in 2018, is $228.81. If an individual's Student Allowance is approved for $150 a week, their living costs will go down to $78.81 a week.

2 In this paper, the Student Support Scheme refers to the full Studylink scheme that includes all financial support available to students — Student Allowances, Accommodation Benefit, the Student Loans Scheme, and Jobseeker Support Student Hardship. This paper is only interested in Student Allowances, Accommodation Benefit and Student Loans Living Costs.

3. Approved by the Tertiary Education Commission for Student Allowances and Student Loans recognised by either the: New Zealand Qualifications Authority (NZQA) or the New Zealand Vice-Chancellors' Committee (Universities New Zealand).

4. The Student Loan Living costs and the Student Allowance is an either or payment, students can not receive the maximum of both, however a Student receiving a student allowance below the maximum, can top up with the loan living costs. Students can claim up to 500weeks (around 4 academic years) of student allowance. If a student is not eligible for the Allowance, they can receive the Loan Living Costs instead.

5 A student is eligible for the Student Allowance if they are either >24 years ,or, for <24 eligibility is based on their parents' income. Weekly Allowance entitlements are also assessed on how much income an individual receives. How much income their partner receives is taken into account if either the student or partner are both over 24 or support a child.

The Accommodation Benefit is a weekly payment that's paid alongside a Student Allowance to help with accommodation costs. How much you're entitled to will depend on your weekly rent costs and any other sources of income. To be eligible to receive the Accommodation Benefi, you must be receiving a Student Allowance, under 24, and if you live with a partner, combined income is taken into account.

2.1 The 2018 Policy Change

Effective from January 1, 2018, the Labour-led coalition government increased the maximum weekly student allowance (SA) and maximum weekly student loan (SL) by $50 per week. The policy change is estimated to benefit more than 130,000 full-time students (Official Information Act, 2018). This research will assess the extent to which an increase in SL, SA and AB housing subsidies have resulted in higher market rents.

As displayed in Table 1, as of 1 January 2018 a single student aged under 24 and living away from home's maximum weekly entitlements under the StudyLink scheme will increase from $177.03 to $227.03 per week; single students with children will increase from $329.57 to $379.57 per week; couples with children (where 1 partner is not enrolled in more than half of a full-time course) will increase from $379.34 to $479.34 per week. The increase in the Student Allowance rates means some students who previously did not qualify for the allowance either because of their or their parent's income will now be entitled.

Roughly 30,000 students lived in wellington at the time of the policy change of 01 January 2018, which was before the new academic year began. The start of the 2018 academic year coincided with the Labour-led coalition Government's fees-free policy — which also had the potential to increase demand for University Tertiary Education.

A 2018 Stuff.co.nz news article, using data sourced from The Ministry of Business, Innovation and Employment, stated that average rental prices for a property in Wellington went up by $42 between November and December of 2017 — in line with the November 21 policy announcement date. However, MBIE notes that rents typically rise at that time of the year as flats change hands (Cooke, 2018). Anecdotally the message coming through is that students, particularly in Wellington, have seen their rents increased as a result of this policy. Stories, which were reported in national newspapers (Cooke, 11 Jan 2018), detail landlords explaining to tenants that they

Table 1: Changes to Studylink student support before and after 01 January 2018*

	2017	2018	Change
1. Student Loan Living Costs	$178.81	$228.81	$50
2. Student Allowance:			
Single <24 years	$177.03	$227.03	$50
Single with children	$329.57	$379.57	$50
Couple with children	$379.34	$479.34	$50
3. Accommodation Benefit:			
Palmerston North	$31	$51	$20
Wellington	$40	$60	$20
Dunedin	$40	$60	$20
4. Number of Students Receiving StudyLink Support			
Student Loan Living Costs	94, 161	90, 246	-4.16%
Student Allowance	47, 384	45, 629	-3.70%
Accommodation Benefit	32, 124	30, 441	-5.24%
Total Number of Students Provided Student Support **	178, 827	167, 754	-6.2%

*Maximum entitlements to student support pre and post policy implementation.
** Academic year is January-December. Figures for total number of students includes student loan for course fees and course-related costs.

were aware of the increase to their student support payments and that their rent would increase accordingly. Our analysis will be able to tell us if these anecdotal stories are part of a wider trend or only an isolated incidence. On 19 January 2019, Minister for Finance, Grant Robertson, posted to social media (Facebook) asking for any students whose landlord had increased their rent substantially due to the increase in student support payments to contact him directly—by Monday he had received around 100 complaints (Cook and Campbell, NZ Herald, 23 Jan, 2018).

The Ministry of Education's manifesto states that the aim of the policy change is to make it easier for students to get by while studying; lowering a significant barrier to education and helping to offset a rapid increase in rents that many students have faced in recent years. The policy will offer non-monetised benefits which include less financial pressure being placed on students to meet their living costs and potential benefits to society and the economy from a more educated workforce (i.e. Marginal Social Benefit as depicted in Figure 2) (MoE, 2017)

Supply & Demand of Housing Allowances

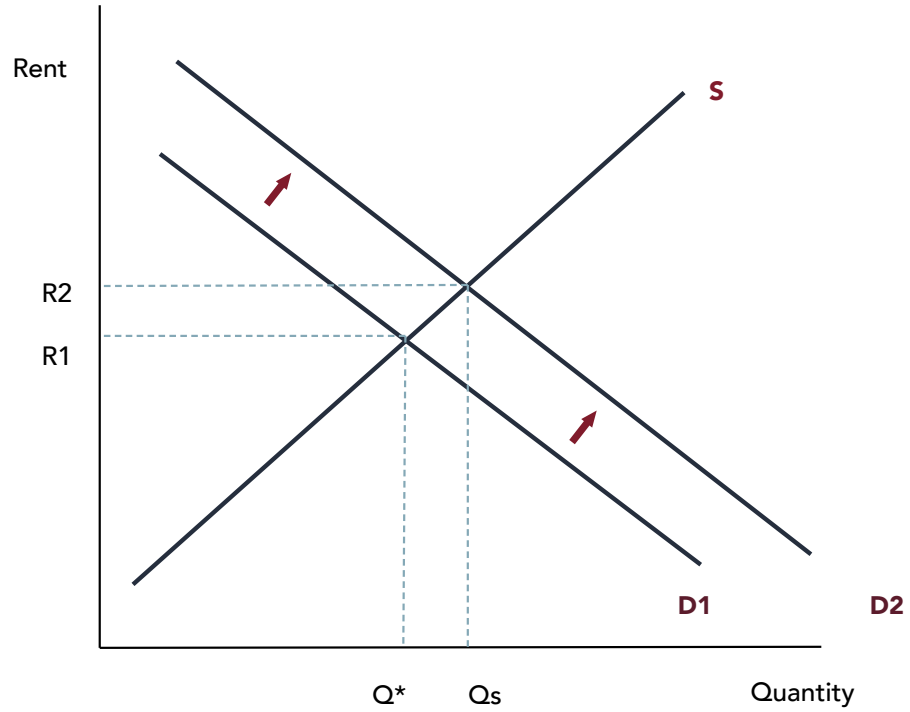


Figure 1: *In the above diagram the demand curve shifts to the right increasing quantity and price and a new equilibrium is set.*

Positive Externalities of Housing Allowances

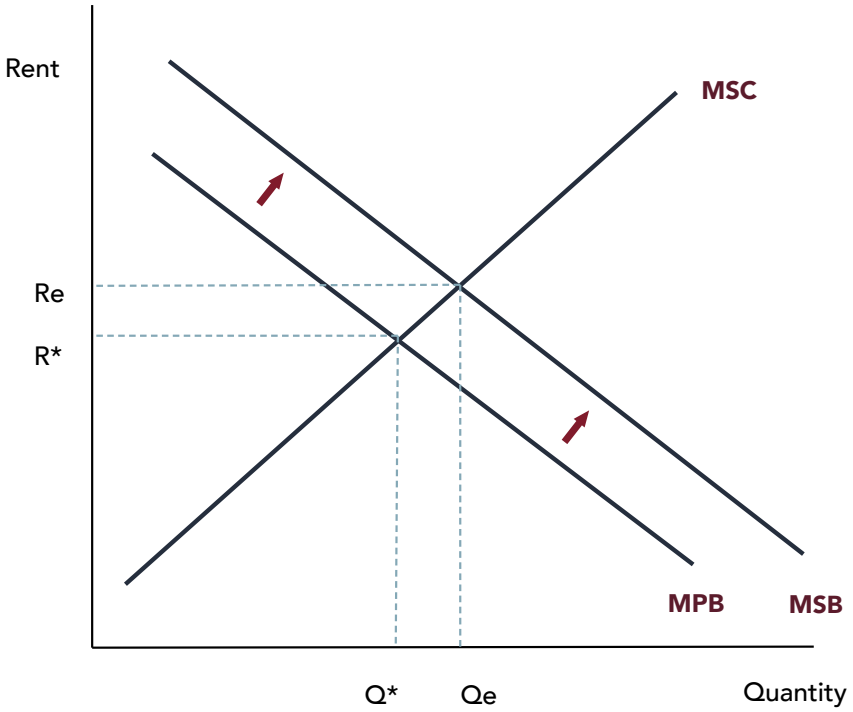


Figure 2: *In the above diagram shows that the Marginal Social Benefit (MSB) of an increase in access to affordable housing through increased cash benefits is greater than the Marginal Private Benefit (MPB). 'Qe' shows the new socially efficient quantity of accommodation benefits.*

2.2 Critical Assumptions & Theoretical Predictions

The Neoclassical growth theory, presented in Figure 1, believes that when the government applies fiscal policy it's likely to increase prices. Therefore, we can hypothesise that from 01 January 2018 we would expect demand for student rentals to increase as a result of the increase to student support through StudyLink. The model (depicted in Figure 1) assumes changing demand won't change supply, which would, in turn, cause our price level (on the vertical axis) to increase. The Neoclassical theory expects the market to eventually return to equilibrium - LRAS curve (Boianovsky and Hoover, 2009).

In the housing market, when rent is at equilibrium level the quantity of housing supplied equals the quantity of housing demanded. Increases in allowances and student loans increases student's aggregate real incomes, this increases aggregate demand. On top of that, this particular policy change was heavily publicised and debated in the mainstream media (Cooke, 2018), (Cook and Campbell, NZ Herald, 23 Jan, 2018) Therefore landlords had ample warning that, as of the next academic year, their tenants would receive a significant $50-$70 increase in income. The impact of the policy would also depend on how perfectly competitive the market is and whether or not tenants have negotiating power with landlords.

With this in mind, in order to adequately assess and understand how effective demand-side subsidies to help with students cost of lining, it is important to understand how elastic or inelastic the housing supply is. Where supply is inelastic, we would expect any demand-side subsidies to drive up rents (Leeuw and Ekanem, 1971). In a 2012 study by the Productivity Commission, New Zealand's elasticity was around 0.7, relatively inelastic and unresponsive. If prices rise by 10% we can expect new housing construction (supply) to increase by 7% (2012). The policy that we are assessing, is a general income assistance program which increased average incomes of students by around 24% percent; and therefore increases the demand for rental housing because an increase in student loan living costs, student allowance and accommodation benefit increases the price students are both willing and able to pay. The economic theory suggests that when the supply of rental housing is perfectly inelastic and demand perfectly elastic then 100 percent of the housing allowance would be captured by landlords in the form of higher rental costs (Viren, 2013).

Figure 2 presents the theory that increasing StudyLink payments to students has a positive social benefit above and beyond what the market can achieve on its own. It also shows that this benefit to society, as a collective, is greater than the private benefit of the individual who receives the benefit. The marginal social benefit is equal to the private benefit plus the additional benefits to society of adequately housing, and assisting the living costs, of an additional student — such as increased health and wellbeing, reduced crime and a more productive labour force in the long run.

2.3. Cultural attitudes towards housing & home-ownership in New Zealand

An intuitive way to understand how country societal norms influence our rental systems is characterized in the model of unitary versus dualist rental systems devised by Kemeny (1995). New Zealand, Australia, USA, and Canada operate within a dualist (individualist) system, while other countries such as Germany, Sweden and the Netherlands (Kemeny 1995) (Hulse, 2003) operate within a unitary (collective) rental systems and hold different cultural attitudes towards renting and home-ownership. A unitary rental system (e.g. Germany) is where the competition between for-profit and non-profit renting leads to restricted rents in the for-profit sector, greater security of tenure and a viable alternative to home-ownership (O'Sullivan and De Decker, 2007)

According to Kemeny, (1995) the foundation of the unitary rental system is based in the social market model in that it strikes a balance between economic and social priorities. In contrast, a dualist rental system (NZ, AU, CA) is where the state allows the market to operate largely unregulated. The efficient market equilibrium, in line with the dualist system, therefore accepts a minority of the population will not be able to satisfy their housing needs through the market, which is where the state intervenes, to provide a residual service (O'Sullivan and De Decker, 2007) (Hulse, 2003), such as state housing, accommodation supplements, Student Loan Living Costs, Student Allowances and Accommodation Benefits. One of the defining characteristics of these forms of state assistance is that access is generally restricted and stigmatized. The StudyLink student support scheme, however, is much less stigmatized in comparison to other forms of state or social assistance as access to it is common and normalised[6].

6 In 2018, 134,286 students (68.1%) received student support through StudyLink. In the same year there was 171,410 domestic undergraduate enrollments in New Zealand and 25, 585 postgraduate enrollments.

The dualist market is also often characterized with offering little security of tenure (O'Sullivan and De Decker, 2007), and accommodation supplements, such as the one studied in this paper, have no bearing on market prices, affordability, quality or suitability of housing. Therefore, the personal choice that these types of weekly cash payments provide are seen as both a benefit and a constraint. Unitary markets, in comparison, are known as having more integrated rental markets, with a mix of for-profit and non-profit providers (Hulse, 2003). Hulse, describes housing in Australia, New Zealand, Canada and the United States as being highly commodified with high rates of both home-ownership and private rentals (2003).

2.4 The Housing Market in New Zealand

In 2017, the year this policy change was announced, the New Zealand housing market was listed as one of the most unfordable housing markets in the world. A study conducted by The Economist into the affordability of the housing market across the OECD, showed that New Zealand has seen the steepest increase in house prices and unaffordability when compared against average income (Global house prices, 2017).

The 15th Demographia International Housing Affordability Survey looked into international housing affordability[7] (Cox and Pavletich, 2019). The survey uses the 'Median Multiple' standard to define affordable housing, which is when the median house price is at or below three times the median wage. Between four and five times is considered seriously unaffordable, and any higher than five times medium income is considered severely unaffordable. The survey had New Zealand's medium multiple at 6.5 — severely unaffordable in 2018's third quarter. For comparison, New Zealand's medium multiple ratio was below 3.0 in the early 1990s (Cox and Pavletich, 2019).

The affordability of home-ownership is inextricably linked to the affordability of the rental market. Hight house prices increase demand and reduce supply[8] of private rentals

7 The survey is conducted across 309 cities over eight countries (Australia, Canada, China, Ireland, New Zealand, Singapore, the United Kingdom and the United States). Wellington has a median multiple of 6.3, Dunedin, 6.1, Palmerston North-Manawatu 5.0, Christchurch 5.4, Tauranga 9.1, and Auckland (9.0)

8 Wellington City Council (WCC) released a report '*Agenda of City Strategy Committee - 2 March 2017*' that estimated a shortage of 3,900 homes in the city, and an additional 37,000 homes would be required to meet a population growth of between 50,000 and 80,000 by 2043. WCC also claimed a 10% increase in rental bonds lodged in Wellington between 2001 and 2013, against a 17% rise in population over that time.

as it incentivises more people to rent over buying and to continue renting longer[9].

High house prices also disincentivises property investment reducing the supply of rental housing. A report on the State of New Zealand's housing, published by the Beehive in February 2018, accepts that high house construction costs, high house prices and low yields have caused rents to rise faster than incomes. Additional impacts of rising demand and stagnant supply include increasing levels of homelessness and poverty (Johnson, Howden-Chapman & Eaqub, 2018).

According to MBIE, the total number of new bonds lodged, nationally, in 2017, was down 9 percent (the steepest decrease in new bonds lodged in relation to the previous year since 1993) — an indicator of reduced supply in a high demand market. The extent to which the increase in StudyLink payments is passed on to landlords will be partly influenced by the rental supply.

9 In 2006 Census, 53.2 percent of people aged 15 years and over owned or partly owned the home they lived in. In 2013, this decreased to 49.8 percent and in 2018 had decreased to 46.6 percent. In 2006, 33.1 percent of households did not own their home, this increased in the 2013 Census to 35.2 percent, and was 35.3 percent in the 2018 census (31.9 percent made rent payments and 3.4 percent lived in a dwelling rent-free. Of the households who paid rent, 83.5 percent rented from a private person, trust, or business, and 0.3 percent of households who paid rent rented from an iwi, hapū, or Māori land trust).

3. Literature Review

Much research has been done on the relationship between demand-side housing subsidies in the housing market and the price of rent. This review provides an overview of the important New Zealand and international literature on the rental housing market and the effect of housing allowances on rent; the incidence of the difference-in-difference methodology in relevant literature; followed by a brief review of the wider social and cultural context of the housing market.

While the design of the Student Loan Living Costs, Student Allowance and Accommodation Benefit is similar to other accommodation supplements that provide weekly cash payments paid directly to tenants, it has one significant difference to other accommodation supplement policies in Australia and Europe as well as New Zealand's Accommodation Supplement (Hyslop and Rea, 2019). Mainly that the Student Loan Living Costs is a loan which must be paid back and eligibility for the Loan is universal regardless of need. The UK Benefit programme and the US Housing Voucher Programme differ in that they provide up to 100 percent of the recipients' rent and payments are a function on the total rent paid and a cap that takes into account other benefits the recipient may also be receiving[19] (Susin, 2002), (Hills, 2007), (Brewer et al, 2015). The maximum amount a recipient of the student support scheme can receive varies (refer to Table 1), but rent paid is not taken into account. Another difference of the US Housing Voucher to the StudyLink scheme is that around 70 percent of those with incomes low enough to be eligible for a US Housing Voucher do not receive one, or any other housing subsidy. These differences could partially explain any variation in the conclusions of this report in comparison to the literature.

Additionally, research into the effect of Accommodation Supplements paid to tertiary students is limited. A similar study includes the 2020 paper by Doron Sayag Noam Zussman. The paper analyses rent subsidies paid to students in Jerusalem and estimate 20-30 percent of the subsidy was passed on to landlords in the form of increased rents, allowing 70–80 percent of the subsidies remained in the hands of the students. Similar to the Student Loan Living Costs, the subsidy was not means-tested, and, in the case of a household with multiple recipients, each of the students was eligible for a full subsidy.

19 The UK Housing benefit cap on benefit entitlements is called the Local Housing Allowance (LHA) rate.

Laferrère and le Blanc (2004) analyze data from the French Housing Survey to estimate the effect of an extension of housing allowances to students on co-residence choices. Between 1991-1993 eligibility for housing allowances were extended to all low-income households, including students, regardless of their parents' resources provided they lived in an independent dwelling. The study found the policy enabled more students to move out of their parents' home and provided a greater choice of location and housing quality. Another finding in the study was that the reform had no significant impact on student enrollments or study choices. No study on the effect of Accommodation Supplement payments to tertiary students in the context of the New Zealand housing market has been done, this paper, therefore, seeks to fill that gap in the literature.

3.1. Demand-side subsidies — landlord capture

A common criticism of housing subsidies is that they put pressure on the market for private rentals. The consequence of this increased demand is to undermine the effectiveness of the policy (Salvi Del Pero et al., 2016). Therefore, the majority of the research into demand-side housing subsidies seeks to answer: to what the extent is the increase in accommodation subsidies capture by landlords. While the magnitude of these estimates vary widely, across country, time and methodology, from 20 percent to 78 percent (Doron Sayag, Noam Zussman, 2020), (Collinson and Ganong, 2018), (Gabrielle Fack, 2006), (Hyslop and Rea, 2018), the literature provides strong evidence that housing allowances can have a significant impact on market rents. The modern literature on the effect of demand-side subsidies across numerous housing markets globally, provide a strong context to help frame our results — Jerusalem (Doron Sayag a, Noam Zussman, 2020), New Zealand (Dean R. Hyslopa, David Reab, 2019), Finland, (Matti Viren, 2013) (Aki Kangasharju, 2010), France (Gabrielle Fack, 2006) United States (Collinson and Ganong, 2018), United Kingdom (Gibbons and Manning, 2003).

Morrison (1995), looked into the major policy reforms of the National Government's Housing Restructuring Act (HRA), which came into effect 1 July 1993, including the removal of income-related rents, the introduction of the Accommodation Supplement, the establishment of Housing New Zealand Ltd to market former state houses and the setting up of the Ministry of Housing to provide policy advice. Morrison appears critical of the introduction of the Accommodation Supplement due to it transferring responsibility for supplying housing at a level that recipients can afford, from the hands

of the state (and one guaranteed source of supply of low-income housing) and into the hands of the housing market (Morrison, 1995). He concludes that the impact of the Accommodation Supplement on recipients is to drive up demand and reduce supply. Morrison concludes that this policy change has larger social consequences as it results in a geographical dimension to price, exacerbating neighbourhood segregation and inequality of access to services including education and health.

The reforms studied by Aki Kangasharju (2010) increased allowance payments based on housing characteristics, but have little effect on eligibility. The study looks into the impact of housing allowances to low-income households in Finland and finds that for each one euro of additional allowance paid, rents of claimants increased by 60–70 cents.

Empirical research, in the New Zealand context, on the effects of the Accommodation Supplement on the price of rent includes two aggregate analyses with conflicting conclusions (Stroombergen, 2004) and (Grimes et al. 2013). Grimes et al, developed an aggregate housing market model to analyze responses to exogenous shocks and policy changes and found that greater Accommodation Supplement receipts lead to increased house, land and rental prices, which incentives greater construction. Consistent with the literature, Grimes expects the Accommodation Supplement to have an effect on rents if the landlord supply is inelastic and find that around 35 percent of the total Accommodation Supplement is passed on to landlords. Stroombergen (2004) models the aggregate historical relationship between market rents and Accommodation Supplement. In contrast to the findings of Grimes et al. (2013), Stroombergen finds a very small and statistically insignificant effect of Accommodation Supplement on rent. Eriksen and Ross (2006) examined the impact of an increase in the supply of vouchers and found no evidence that an increase in vouchers affected the overall price of rental housing.

Gabrielle Fack (2006) studied the impact of a 1990s French housing benefit reform and found that for each one additional euro provided to new housing benefit claimants the price or rent increased by 78 cents. Fack's research also concluded that the benefit increase resulted in an increase in demand, which was not matched by an increase in housing supply in the short and middle term. The study controlled for variables such as household size, geographical location and age group of head of household.

Susin (2002) looks into rent prices across 90 US metropolitan areas to investigate whether the low-income housing voucher programme increased rents for unsubsidised poor households. The main finding is that low-income households in metropolitan areas with more vouchers have experienced faster rent increases than those where vouchers are less abundant and that vouchers have raised rents by 16 percent on average.

Matti Viren (2013) analyse Finnish panel data to estimate the impact of housing allowance on rental prices and find large rent effects. The paper estimates that 33-50 percent is passed on to landlords. One main difference of the housing allowance in Finland, compared to New Zealand, it that in some instance the housing allowance is paid directly to the landlord and not a cash payment to the tenant.

As an alternative to looking at the impact of an increase to housing subsidies, Gibbons and Manning (2006) completed an analysis of the impacts of a 1996 UK policy reform that *cut* housing benefits for new recipients and found it resulted in significant rent reductions, but only for tenants who were directly affected by the policy.

Keith Jacobs (2015) looks into the role of the Australian government in low-income housing and argues that the current political economy of Australian housing is a form of 'reverse welfarism' that exacerbates social inequality. Jacobs argues that increasing supply is much more beneficial to solving inequality and suggests that subsidies benefit investors and homeowners over low-income renters.

3.2 Supply-side housing subsidies

The extent to which an increase in accommodation supplements is expected to drive up rents is related to the supply of appropriate housing in the market (Eriksen and Ross, 2015), (Susin, 2002), (Hyslop & Rea, 2019), (Viren, 2013). Supply-side housing policies often include support for construction, financing and incentives for landlords in the form of low-interest loans, capital grants, tax-relief or rent controls (Kemp, 2000). Murray (1983), looks into housing subsidies sponsored by the Department of Housing and Urban Development (HUD), which covers 1.19 million subsidised housing starts over the period 1961-1977 and found either no measurable effect on supply; and that more than 85 percent of the effect of the remaining 0.72 million HUD sponsored starts during the period was lost to the displacement of unsubsidised starts by subsidised starts in the long-run (Murray, 1983).

J Sa-Aadu (1984) examines the effectiveness of the Equivalent-benefit Housing Allowance Program, a demand-side low-income housing program to the supply-side Section 8 New Construction and Substantial Rehabilitation programs. Sa-Aadu compares the two and found that the demand-side strategy resulted in larger benefits in terms of relative cost-effectiveness and the potential number of households to receive a given level of funding. However, in terms of the other goals associated with low-income housing policy, both strategies had similar changes in housing consumption, impact on housing affordability, changes in purchasing power, proportion of the subsidy spent on housing.

3.3 Elasticity of supply of rental housing

The degree to which an increase in accommodation subsidy affects the price of rental housing is in large part determined by the elasticity of housing supply of the market (Eriksen and Ross, 2015), (Susin, 2002), (Hyslop & Rea, 2019), (Viren, 2013). Across the papers, there is a general consensus that housing supply is inelastic and that housing subsidies, which increase the demand for housing, results in increases in rent prices, affordability problems and shortages (Oxley, 2007), (Amman, 2012). This effect also implies the benefits of the subsidy instead transfers income from tenants to landlords (Susin, 2002), (Leeuw and Ekanem, 1971), (Hyslop & Rea, 2019), (Viren, 2013).

Susin (2002) uses cross-section evidence on the demand for housing and data from the U.S. Bureau of Labor Statistics' 1967 survey to analyse rent differences between cities to estimate the elasticity of supply of rental housing. The paper estimates that vouchers will increase rents if they fail to stimulate a supply response, such as incentivising new construction, reducing demolition, or increasing maintenance. The study finds that vouchers raised rents by 16 percent on average, a large effect consistent with a low supply elasticity. Susin (2002) and Viren (2013) both suggest that elasticity of supply is close to 0.

Leeuw and Ekanem (1971) use survey data to estimate the elasticity of supply of rental housing. Their study of thirty-eight metropolitan areas across the United States found that a general income assistance program that increases average incomes in poor neighbourhoods by 10 percent, would increase rents in those by 1 to 4 percent in the long run. They claim assistance specifically earmarked for housing would have severe rent effects.

3.4. Income elasticity of housing expenditure

A number of studies have been done on income elasticity of housing expenditure with regard to income, and the estimates vary substantially across the literature, with results ranging 0.25 to 0.55 for *most* renters (Albouy et al, 2016), (Carliner, 1973), (Hyslop & Rea, 2019), (Stegman and Sumka's, 1978). The consensus across the literature is that housing demand is income and price inelastic, and appears to fall with household size (Albouy et al, 2016).

Hyslop & Rea (2019) exploit a natural experiment in an increase of accommodation supplement zoning in Auckland, New Zealand, where average support was $6.80 per week higher inside than outside the new boundary, and find that the elasticity of housing expenditure with respect to income is about 0.55.

Stegman and Sumka (1978), Ililanfeldt (1982) investigate income elasticities across different housing markets and household types in non-metropolitan cities[20] and find that the income elasticity is lower for poor, large, or black families. Ilianfeldt's explains that poor families have more pressing non-housing needs, and therefore make different choices around how to spend an increase in income, prioritising food, clothing, or durable goods. The paper also concludes this lower income elasticity for large or black families can be explained by housing space requirements of large families, and racial discrimination limiting black households to well-defined neighbourhoods (Ililanfeldt, 1982).

Stegman and Sumka's (1978) paper concludes that elasticity estimates for the entire population may not adequately show variations among subpopulations who compete for housing in relatively independent sub-markets or who have different housing preference patterns. Their paper presents a range of estimates of elasticity of rent with respect to income; (1) with respect to total current income the elasticity estimate is 0.25; (2) averaging the earnings of the head-of-household and adding non-wage income estimates an elasticity of 0.37; (3) adjusting averages to factor in the variation of expectations of future income produces an estimate of 0.38.

Hanushek and Quigley (1980) looked at two years of longitudinal data for low-income renters in Pittsburgh and Phoenix. They argue that achieving housing consumption goals

20 Includes the 25 cities in North Carolina which have populations between 10,000 and 40,000)

through rent subsidies is expensive; and that responses to price reductions are inelastic and evolve slowly over time. Their research found that the elasticity to price changes is dependent on different assumptions and contexts including the interaction of demand elasticity, adjustment parameters, and the supply elasticity. Their study presented much smaller estimates of price elasticity of housing demand that range from -.22 to -.54 in Pittsburgh and from -.19 to -.63 in Phoenix. Grimes & Hyland (2013) study included a simulation that showed a 10% increase in AS leads to a 3.48-3.79% increase in housing expenditure.

3.5 Rent-controls

Rent controls were introduced in many European countries during the First World War. The UK introduced *The Increase of Rent and Mortgage Interest (War Restrictions) Act 1915* which restricted rents to their August 1914 level. The introduction of rent controls contributed to a decline of the private rental housing supply (O'Sullivan and De Decker, 2007).

David P. Sims (2007) looks at the natural experiment of the 1995 end to rent control in Massachusetts to estimate the effect the policy has on quantity, price and quality of rental housing to find that rent controls decreases the quantity of rental units supplied. It also lengthens renter stays. In addition, some evidence suggests that rent control produces small flow-on effects that decrease the price of the non-controlled rental market. George Fallis and Lawrence B. Smith (1984) look into the impact of rent controls on pricing where there are exemptions to those controls, such as newly constructed, newly vacated or high-priced housing. They found rents on exempted units, in the Los Angeles area, are higher under rent controls than they would have been in the absence of controls.

3.6 Housing choice and quality of housing

A consistent theme across the literature, but less empirically tested, is the effect that an increase in housing subsidy has on tenants housing choice and quality of housing. Housing allowances have the ability to improve housing quality for vulnerable groups and contribute to a reduction of inequality in the society and lead to more efficient outcomes over time (Nordvik and Sørvoll, 2014), (Quigley, 1999), (Fack, 2006), (Sinai and Waldfogel, 2005). Hyslop and Rea, looked into a policy change which created a new accommodation supplement area around central Auckland, New Zealand that resulted in an

increase in accommodation supplement entitlement for residents inside the new boundary. The study suggested that an increase allows recipients to afford more or better quality housing, and to move to neighbourhoods with better amenities, resulting in recipients seeking out higher cost housing (Hyslop and Rea, 2018). (Wood, et al. 2008) analyzed the Temporary Assistance for Needy Families under the U.S. Department of Housing and Urban Development's Welfare to Work Voucher program, and found that housing vouchers significantly reduced homelessness, crowding, household size, and the incidence of living with relatives or friends, increased housing mobility while reducing the number of subsequent moves, and resulted in small improvements in neighbourhood quality.

Sinai and Waldfogel (2005) look at the effect of low-income housing subsidies on the quantity of housing consumed — rather than equilibrium rents — and asks whether subsidised housing increases the housing stock? Their results support the theory of a positive real effect of low-income housing subsidies. They use a cross-sectional regression to model the total quantity of housing in a market on the quantity of subsidised housing in the market. They seek to estimate whether housing markets, in the US, with more subsidised housing also have more total housing, after accounting for housing demand. These subsidies include both project-based programs such as public housing and Section 8 New Construction and tenant-based voucher programs, such as Section 8 existing housing assistance, that aims to shoulder a portion of the cost of privately provided housing.

Housing Allowances, such as the as the StudyLink student support scheme, are both housing policy and welfare policy (Priemus and Kemp 2004; Kemp 2007). When spending power is increased in relation to housing opportunities it leads to greater efficiency and equality of opportunity in the form of higher school completion rates, labour market participation and life-time earnings (Quigley, 1999) (Priemus & Kemp, 2004). In contrast, inadequate housing increases crime, the incidence of interpersonal conflicts, and the demand for mental health and general health services (Lok Sang Ho, 1988).

3.7. Data and model related literature—difference-in-difference

Difference-in-difference methodology has been around since its first known use in the 1850s by Dr. John Snow. Snow adopted this controlled before-and-after study to compare two competing water companies in South London, to test the effects of clean-versus-dirty water and before-versus-after in the transmission of cholera and found cholera was transmitted through the water supply rather than air (Snow, 1954).

Difference-in-difference has grown in popularity in the economics literature since Ashenfelter and Cards 1985 paper which estimated the effectiveness of training on participants earnings. Difference-in-difference has since been used to estimate the effects of a variety of policy questions. Blundell et al., (2004) examine the impact of a mandatory job search program and found that it raised transitions to employment substantially. Almond, Hoynes, and Schanzenbach (AER, 2016) use DiD to estimate the effect of access to food stamps in early childhood on adult health and economic outcomes. Waldfogel (1998) uses DiD to look at maternity leave regulation.

Doron Sayag a, Noam Zussman (2020) use hedonic difference-in-differences to estimate the effect of rent subsidies provided to students in Jerusalem and found that 20-30% of the rent subsidy was passed on to landlords. Fack (2006) adopt an ordinary least square regression and difference-in-difference method to estimate the incidence of the 1991-93 extension of the housing benefit program. One of the most prominent difference-in-difference papers is the 1994 paper by David Card and Alan B Krueger, which estimates the effect of an increase to New Jersey's state minimum wage from $4.25 to $5.05 on employment, wages and prices at fast-food stores. Their study surveyed 410 fast-food restaurants in New Jersey and the control group of eastern Pennsylvania one month before and eight months after the policy change took effect on April 1, 1992. The study found no evidence that the minimum-wage increase in New Jersey reduced employment, in contrast, the results showed a relative increase in employment of low-wage workers in New Jersey.

David P. Sims (2007) used difference-in-differences to determine how rent controls in Boston affected the quantity, price and quality of rental housing. Their methodology compares the change in average outcomes for rentals in zones that experienced the removal of rent control in 1995 and those in zones that did not change status. Aki Kangasharju (2010) adopts difference-in-differences to estimate the effect of an increase in allowances on rent prices by comparing assisted families against non-assisted families before-and-after the reform. They regress logrent per square meter on controls (year dummies, allowance dummy, and interaction term) to estimate the effect.

Bertrand et al. (2004) look into the reliability of difference-in-difference models where data is often subject to serial correlation, which can cause serious overestimation of t-statistics and significance levels. To do this, they create a model using randomly generated placebo laws in state-level data on female wages from the Current Population

Survey and find that conventional DiD standard errors significantly understate the standard deviation of the estimators. Their investigation into solutions to the issue of serial correlation is block bootstrap when using large data sets. They conclude that standard econometrics packages offer satisfactory solutions when handling small datasets such as; (1) they find that collapsing the data into pre- and post periods will give consistent standard errors (2) they find that allowing for an arbitrary autocorrelation process when computing the standard errors works with large datasets.

The 2018 working paper by Anastasiadis et al, looks into the usability of the Integrated Data Infrastructure (IDI) managed by Statistics NZ (this report also uses administrative data from Statistics NZ's IDI). The report is intended for data scientists and researchers interested in techniques for evaluating policy impact and looks into improving and innovating new analytical techniques and best means of utilising existing data with the aim of improving the evidence regarding the impacts that social interventions have on wellbeing. Their main research question uses Statistics New Zealand's Social Survey (NZGSS) to look at how placement in social housing impacts on wellbeing and the effectiveness of social housing interventions. However, the report seeks to answer two additional questions relating to the methodology used; (1) Can linked administrative and survey data be used in the IDI to identify the wellbeing outcomes of people before and after a social policy intervention? (2) What are the key lessons for using the IDI to assess the impact of policy in wellbeing terms? They find that survey and administrative data are complements not substitutes in the IDI; and that Survey data could be designed to take advantage of the IDI data much better (Anastasiadis et al, 2018).

3.8. Summary

In light of the current housing crisis[21], the issues around housing have gained popularity in New Zealand. Peter Nunns (2019) from the University of Auckland looks into the causes and economic consequences of rising regional housing prices in New Zealand. Calista Cheung's (2011) Working Paper, which relates to the 2011 OECD Economic Review of New Zealand, looks into policies to aid in rebalancing New Zealand's housing markets. Peter Dykes (2016) looks into the effectiveness of the New Zealand government's policy initiative that introduced the quasi-market approach for delivering social housing under the Social Housing Reform Programme.

21 In a report commission by the New Zealand Government, *A Stocktake of New Zealand's Housing* Johnson et al 2018, refer to New Zealand' current housing situation as 'housing crisis'.

For most households, housing costs make up the significant majority of their spending. In New Zealand, much of the rental housing stock is of poor quality and tenants have few rights and little security. Looking at individuals rather than households, just over 50 percent of all New Zealander's live in a rental home (Johnson et al. 2018).

The overarching theme and consensus in the literature is that housing supply is inelastic and that increases or decreases in housing allowances have a significant impact on the price of rent and that landlords are benefiting from a portion of the subsidy — often substantially (Fack, 2006) and reducing the net-benefit of the payment for the intended low-income recipient. This holds true regardless of country-specific and subsidy-specific contextual factors, with the exception of a New Zealand paper that found very small and statistically insignificant effect of accommodation supplement on rent (Stroombergen, 2013). Overall, the studies with stronger or more appropriate methodologies tended to have lower estimates of landlord capture (Brackertz, et al. 2015).

The conclusion many of the past literature draws is to present another question;
How effective and efficient are demand-side accommodation subsidies? And
Should policymakers be looking for more creative means of achieving affordable accommodation options for students? Kemp (2000) describes housing allowances as a safety-net approach favoured by liberal market-driven welfare models, while also being consistent with social democratic welfare regimes. As for any social policy instrument, the overarching objective of housing allowances are that they should increase aggregate well-being (Nordvik and Sørvoll, 2014). Housing allowances, in order to be effective, must both improve housing quality for vulnerable groups and contribute to a reduction of inequality in the society.

4. Hypotheses

Hypothesis 1: The increase to student support payments had no effect on mean rents of those receiving StudyLink payments for the one year following the policy taking effect on 01 January 2018.

Alternative hypothesis: The increase to student support payments affected mean rents of those receiving StudyLink payments for the one year following the policy taking effect on 01 January 2018.

5. Data

The data used in conducting this research is administrative data from The Ministry of Business, Innovation and Employment (MBIE), the Ministry of Social Development (MSD) and the Ministry of Education (MoE) derived from Statistics New Zealand's (SNZ) Integrated Data Infrastructure (IDI), which contains person-centered microdata.

The tenancy bond data is sourced from MBIE, who collect the data from bond lodgment forms completed by tenants and landlords for residential tenancy agreements. The variables of interest are weekly rent, number of bedrooms, tenant count and territory code[10]. I look at private rentals only. The dataset does not provide any details on the characteristics of the properties where recipients live such as age of property, square-meters of property or number of bathrooms.

Student loans and allowances data from StudyLink, a department of MSD includes data provided by applicants, their education provider(s), and related parties, which is used by StudyLink in assessing eligibility and entitlement to student support. This data set allows us to identify the population of interest. The treatment group in this study is limited to eligible students receiving either Student Loan Living Costs, Student Allowance or Accommodation Benefit. The key information that I am interested in is the average living costs borrowed during the calendar year, average accommodation benefit paid to a student during the calendar year, average allowance paid to a student during the calendar year, both pre and post the policy announcement date.

10 The tenancy bond data also includes region code, meshblock code, address UID (linked to the geocode address table). Weekly rent and tenant count are our dependent variable (y).

Tertiary education data provides information about students who are either enrolled or who have completed qualifications in formal/non-formal tertiary qualifications at government-funded tertiary education organisations. The data includes prioritised address history for all individuals where address information exists. Uses a simple set of business rules to limit the full address table to a best-guess list of residential addresses. Where possible, Statistics NZ has provided a corresponding meshblock, territorial authority, and regional council code for each snz_uid.

The data extract used is created by linking the MoE, MSD and the Statistics NZ address_notification data sets together by merging at the spine using the *snz_uid* variable. *Snz_uid* is a global unique identifier for each distinct identity in the IDI created by Statistics NZ. This table is then linked to the Tenancy Bond Data via the variable *snz_idi_address_register_uid*. The *snz_idi_address_register_uid* allows us to identify who was living at each address during the period of a particular tenancy[11]. We then link the *snz_uids* of interest to Statistics NZ's *personal_detail* table to get demographics for these individuals.

The dataset is cleaned to include only the variables of interest[12]. The variables provided in the MoE dataset is important in adding controls to the regression for level of study, tertiary education providers, and type of qualification, and for removing high-school level students from the treatment group.

Because our analysis uses Tenancy Bond Data to access mean rents, our sample, therefore, does not capture situations where a landlord increases an existing tenant's rent, but the bond remains unchanged. Additionally, short-term tenancies with a fixed length of less than six months tend to be under-represented (this is where a survey conducted before and after the policy, on a sample of the population, would be a useful means to pick up recipients in these circumstances. However, this study uses only the data available in the Statistics New Zealand IDI).

11 Tenancy Bond data is linked via the household addresses rather than by person (snz_uid). This is because the quality of person linking variables of tenants is poor (i.e. often only partial information given for each tenant and often doesn't include date-of-birth or sex.

12 For the purpose of this paper, a student is defined as a tertiary student enrolled in a formal qualification level 4 or above, studying either part-time or full-time, internally or extramurally in New Zealand. StudyLink students are defined as students who are also receiving some form of weekly financial assistance from StudyLink; either student loan living costs, student allowance or accommodation benefit. This research is not interested in those who only receive fees or course related costs, as this financial support did not increase and does not have any bearing on daily cost of living or purchasing power.

Table 2: Sample demographic characteristics

	Treatment		Control (Non-Student Tenants)	
	Pre	Post	Pre	Post
1. Age:				
Palmerston North	21.22 (4.76)	22.02 (5.56)	24.15 (7.61)	25.15 (7.61)
Wellington	21.07 (2.80)	21.97 (2.81)	24.04 (8.28)	25.03 (8.30)
Dunedin	20.61 (2.64)	21.02 (2.62)	21.97 (4.69)	22.87 (4.70)
Control[13]	—	—	25.82 (12.3)	26.71 (12.1)
2. Female:				
Palmerston North	0.640 (0.48)	0.677 (0.47)	0.627 (0.48)	0.607 (0.48)
Wellington	0.553 (0.49)	0.570 (0.49)	0.538 (0.49)	0.489 (0.49)
Dunedin	0.530 (0.49)	0.604 (0.45)	0.537 (0.45)	0.536 (0.49)
Control	—	—	0.644 (0.48)	0.649 (0.48)
3. Ethnicity:[14]				
Palmerston North:				
Māori	0.22 (0.42)	0.06 (0.24)	0.133 (0.33)	0.126 (0.33)
European	0.79 (0.41)	0.65 (0.48)	0.774 (0.41)	0.756 (0.42)
Pacific	0.04 (0.19)	0.09 (0.29)	0.039 (0.19)	0.038 (0.19)
Wellington:				
Māori	0.19 (0.39)	0.14 (0.34)	0.153 (0.35)	0.184 (0.38)
European	0.87 (0.33)	0.78 (0.42)	0.831 (0.37)	0.781 (0.41)
Pacific	0.01 (0.11)	0.01 (0.10)	0.036 (0.18)	0.031 (0.17)
Dunedin:				
Māori	0.14 (0.34)	0.15 (0.36)	0.111 (0.314)	0.113 (0.31)
European	0.76 (0.43)	0.73 (0.45)	0.796 (0.40)	0.795 (0.40)
Pacific	0.04 (0.21)	0.05 (0.15)	0.061 (0.23)	0.055 (0.23)
Control:				
Māori	—	—	0.375 (0.30)	0.379 (0.31)
European	—	—	0.573 (0.44)	0.578 (0.44)
Pacific	—	—	0.053 (0.16)	0.045 (0.19)
No Observation	36, 279	40, 029	140,000	140,000

11 The control group in row four of each panel is made up of non-student in Gisbrone, Napier, Hastings and Timaru only, while the control group in columns 3 and 4 include non-StudyLink tenants in the treatment city.
12 Multiple answers possible so will add up to more than 1

Table 3: Sample characteristics

	Pre	Post
6. Student Populations:[15]		
Palmerston North	0.1274	0.1155
Wellington	0.1381	0.1359
Dunedin	0.1776	0.1764
Gisborne	0.0260	0.0239
Napier/ Hastings	0.0245	0.0167
Timaru	0.007	0.006
3. Distribution of StudyLink recipients[16]		
Palmerston North	0.1755	0.1661
Wellington	0.4635	0.4606
Dunedin	0.3610	0.3733
4. Fraction receiving student loan living costs	0.5070	0.5390
Fraction receiving student allowance	0.3191	0.3382
Fraction receiving accommodation benefit[17]	0.2163	0.2256
Fraction receiving LC, SA & AB	0.1914	0.1876
5. Number of StudyLink recipients:		
Palmerston North	3684	3540
Wellington	12030	11418
Dunedin	11832	11886

Notes: Samples taken of StudyLink recipients between 01 January 2017 and 31 December 2018. Standard deviations are in parentheses.

Table 3 (Sample Characteristics) presents the fraction of students receiving living costs, student allowance and accommodation benefit increases in 2018, post policy, however the fraction receiving all three forms of financial student support decreases. This could be in part due to the increase in student loan and student allowance meaning students receive enough from the student allowance payments they no longer need to be topped up with the loan payments; which would be a positive side effect of the policy in that it would reduce student debt in the long-run.

15 Student population as a percent of cities total population, includes all tertiary students level 4 and above enrolled in a formal qualification.
16 The makeup, as a percent, of the full sample of StudyLink recipients across the three cities.
17 Fraction of the total number of students who receive some form of StudyLink support.

Table 3, panel one shows the make-up of the sample of students over the three cities of interest. In 2017, 17% of the students in our population lived in Palmerston North, in 2018 this decreased to 16.61%. For the same period, Dunedin students made up 36.10% of our population, which increased in 2018 to 37.33%. Panel three shows the number of StudyLink recipients in our population for each city.

6. Method

The difference-in-difference methodology chosen is adapted from David Card and Alan B. Krueger's *Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania* article, as well as Dean R. Hyslop and David Rea's (2019) *Do housing allowances increase rents? Evidence from a discrete policy change.*

I will be using the econometric method of difference-in-difference to look at causal effect. DiD is used to estimate the effect of a specific intervention or treatment (such as a policy or regulation) by comparing the changes in outcomes over time between a population — the treatment group and a control group. DiD is one of the most commonly used methods for estimating causal effects of policy and programmes where the policy was not implemented as part of a randomised control trial.

The treatment cities were selected based on cities where there is a major university and large tertiary student populations. In contrast, the control cities were selected for having no university and a very small student population. The control group also includes non-students in the treatment cities.

To gain a robust and broad view of the policy impact across New Zealand, this study estimated the policy impact in three major university cities. Additionally, to ensure that the control group isn't heavily influenced by city-specific factors I use an aggregate of four cities across New Zealand. Card (1990) in his DiD study of labour market effects following an increase of Cuban migrant workers, uses other US cities similar to Miami — but that had not experienced the migration influx — as their control groups. Similarly, Card & Krueger's (1994) study on the impact of an increase in the minimum wage on employment in New Jersey used the neighbouring state of Pennsylvania, where there was no minimum wage increase, as the control. The control group selected in this study is therefore consistent with the DiD design of Card (1990) and Card & Krueger (1994).

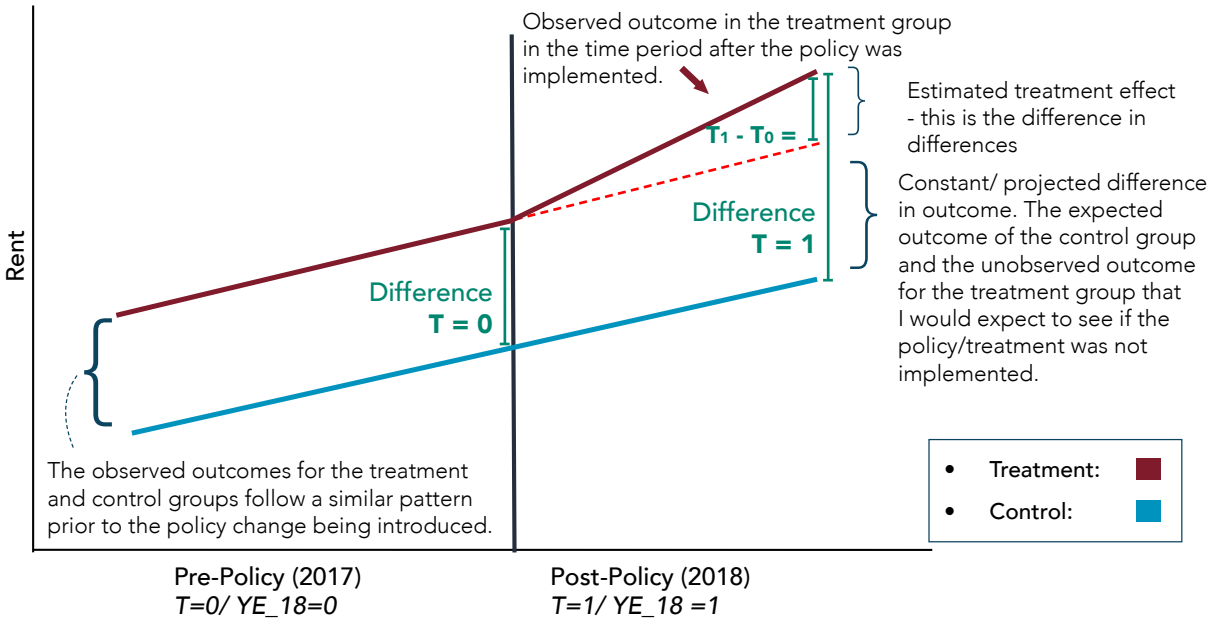
Our control group is made up of four New Zealand cities, with no university and a significantly small student population. Table 4 presents each cities student population as a percentage of the cities overall population. In 2017, the selected control cities – Gisborne, Hastings, Napier and Timaru had a student population of 2.60%, 0.43%, 5.05% and 0.7% respectably. In comparison, the treatment cities of Palmerston North (Massey University), Wellington (Massey University and Victoria University of Wellington), and Dunedin (University of Otago) have a student population of 12.74%, 13.81%, 17.76% respectively.

When running regressions, I also include in the control group non-student households in the student city of interest. Prior to deciding to include these households in the control, I ran simple regressions where I regressed rent for all households in the treatment city against the control group and found a small statistically insignificant increase. If the policy were to impact rents of students we can expect to see that take effect in towns well known for being university towns and heavily populated by young students away from home.

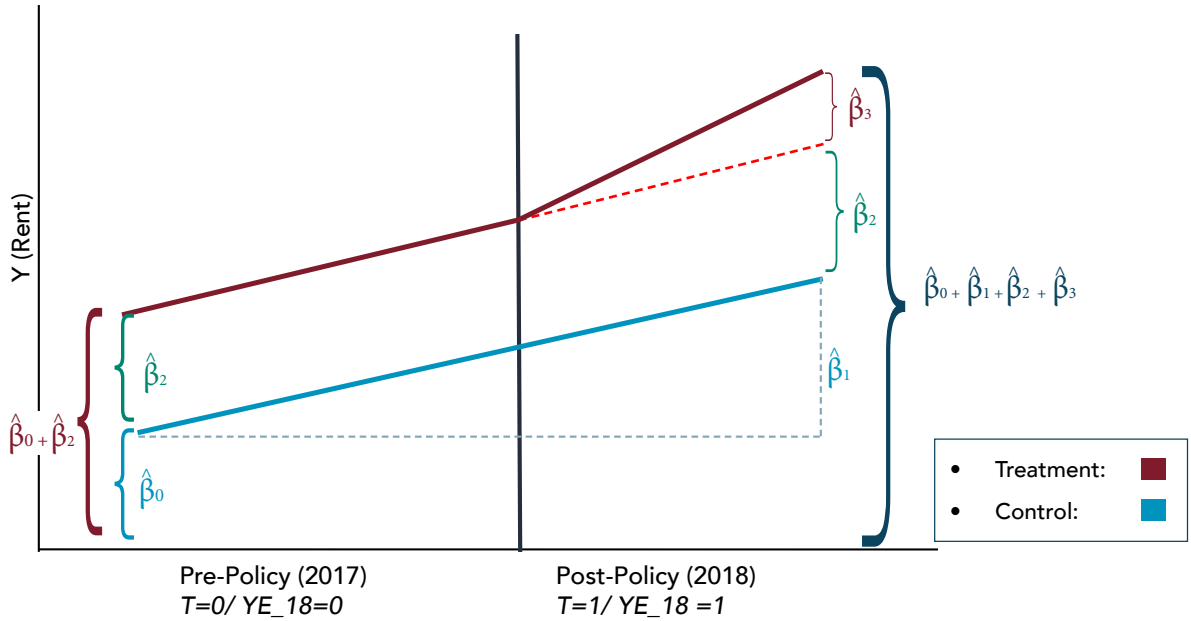
Another main reason why I include Gisborne, Napier, Hastings and Timaru as control cities, additional to non-students in the treatment cities, is due to the potential for an increase in allowance payments to increase rents for unsubsidised households. Susin (2002) conducted a study on this topic and found that low-income households in metropolitan areas with more vouchers experienced faster rent increases than those where vouchers are less abundant and that vouchers have raised rents by 16% on average. By including an aggregate of four non-student cities, and controlling for any city fixed effects with dummy variables, this should remove any bias from the result.

The identifying assumption of our difference-in-difference approach is that the difference in the rent prices (and the crowding of student flats) between treatment and control groups, would have remained constant in the absence of the launch of the policy — this assumption is called the common trends assumption. Figure 3, provides an intuitive, illustrated example of the common trends assumption. Figure 3 shows that in the one year prior to the policy that rent prices in the treatment and control groups follow a common trend. The trend in the control group, therefore, approximates what would have happened in the treatment group post-treatment in the absence of the treatment.

Figure 3: Theoretical Model of Difference-in-Difference Estimation



Theoretical Model of Difference-in-Difference Estimation



The above diagramm provides a visual interpretation of the β coefficients as they relate to our DiD equation:

$Rent_i = \beta 0 + \beta 1 * Treatment_i + \beta 2 * post_i + \beta 3 * Treatment * post_i + X'_i + \varepsilon_i$.

Table 4: Selecting treatment and control groups

2017[18]:

City	Total City Population	Student population	Students as % of total population
Gisborne	48,500	1,260	2.60%
Hastings	79,900	345	0.43%
Napier	62,000	3,135	5.05%
Palmerston North	87,300	11,118	12.74%
Wellington	212,700	29,373	13.81%
Timaru	47,100	327	0.70%
Dunedin	128,800	22,875	17.76%

2018:

City	Total City Population	Student population	Students as % of total population
Gisborne	49,300	1,179	2.39%
Hastings	85,000	456	0.54%
Napier	65,000	3,138	4.83%
Palmerston North	88,700	10,245	11.55%
Wellington	209,000	28,409	13.59%
Timaru	46,296	282	0.60%
Dunedin	130,500	23,025	17.64%

Source for total city population: Population Insights, Statistics NZ

18 Currently (as at 26/08/2020), 2017 population estimates are missing from Statistics New Zealand's published tables. This is because they revised their 2018 and 2019 estimates in 2019 (to reflect outcomes based migration and census 2018 distributions) but are yet to be updated. The 2017 estimates in this table where provided by Statistics New Zealand based on previous estimates and are therefore still on a 2013 base and are therefore inconsistent with 2018-19 estimates.

In our experiment, for the pre-policy period, the trend of change in rent prices for both the treatment group and the control group is a result of a new rental contract. In the post-policy period the change in rent prices for the control group, in the absence of the policy, stays the same (experiences the effect of a new rental contract), whereas the treatment group also experiences the effect of a new rental control as well as the policy-effect — an increase to the maximum student loan living costs/student allowance payments of $50 per week and an increase in the maximum Accommodation Benefit of $20 per week.

To ensure this research design is robust, I test for the common trends assumption[19] and find that the common trends assumption holds and our selection of control group is therefore robust (further analysis on this topic in the Robustness Analysis section).
We adopt DiD method to compare rent prices before the policy was implemented to rent prices after the policy was implemented. To estimate the effect of the January 2018 policy change on student rents we run various regressions of the model:

$$Rent_i = \beta0 + \beta1*Treatment_i + \beta2*post_i + \beta3*Treatment*post_i + X'_i + \varepsilon_i$$

Where the dependent variable $Rent_i$ is the weekly rent (in dollar values) of observation-i; $Treatment_i$ is a dummy variable, which is 1 for StudyLink recipients in University cities and 0 for control cities. $Post_i$ is a dummy variable with the value 1 for the 12 months following the policy change and 0 for the 12 months prior to the policy change; Treatment*post is interaction term dummy variable with a value of 1 where the observation is both a StudyLink recipient in Palmerston North, Wellington or Dunedin and is also in the post-policy year of 2018. X'_i is a vector of control variables, that include year and city fixed effects. ε_i captures unobserved residual effects. β0 is the average rents for the control group. β1 is the average difference between treat and control before treatment. β2 is the trend and represents the adjustment on the y-intercept for the treatment group. β3 is the main coefficient, which captures the average effect of the treatment — the impact of the policy on rents.

19 The main threat to this research design is a potential failure of the common trends requirement for difference-in-difference estimation. The common trends requirement assumes that the treatment group would have grown at a rate similar to the control group (in the absence of the treatment) and that this additional growth is therefore caused by the policy change. Figure 3 provides a graphical representation of the common trends assumptions for treatment and control groups. The parallel trends requirement is explored further in the robustness checks.

6.1 Ordinary Least Squares Regression

Each bond lodged in the Tenancy Bond dataset has a unique bond_uid, which means that all bond_uid's in post/2018 are unique and distinct from the pre/2017 period. The main analyses, therefore, treats the data as repeated cross-sections and I adopt the ordinary least squares method to run the DiD regression. The OLS regression can be used for DiD analysis (Sims, 2006), Fack (2006). The regression coefficients results take the average prices in the control group from the pre and post time period and then takes the average change in prices from the treatment group from the pre and post year and the interaction term presents the difference in those differences.

I begin by using the difference-in-differences approach to regress weekly rent in dollars on dummy variables for the independent variables post, treatment, age, sex, ethnicity[20], level of study (certificate, diploma, bachelors degree, post-graduate certificate or diploma, honors, masters, PhD), type of institution (Polytechnic, Wanaga, University) and the interaction term treatment*post.

In a separate regression, I regress logrent instead of weekly rent in dollars. The model is estimated separately for 2-3 bedroom households and 5+ bedroom households. I also run separate regressions for 1 year pre/post *implementation* of the policy (1 January 2018) and 1-year pre/post the *announcement* of the policy (21 November 2017).

20 The inclusion of a range of control variables will help prevent the regression results from being influenced due to omitted variable bias.

7. Analysis and results

I now present the analysis of the effect of the 2018 policy change that increased the Student Loan Living Costs and Student Allowance payments by $50 per week and Accommodation Benefit payments by $20 per week. I first present descriptive trends around the policy change, before presenting a number of regression analysis on the 2018 policy's impact on student rent, followed by regression results on the policy's impact on household crowding.

7.1 Descriptive Analysis

This section presents trends in mean rents, StudyLink payments and recipients, demographic characteristics and student housing choices surrounding the policy change. Figure 4 presents annual trends in mean rent payments made by StudyLink recipients, by city, in comparison to the control group for the three years leading up to the policy change and the one year following the policy change. Graph (a) presents mean rents for 3-4 bedroom properties and shows similar trends in rent across time for each group, as we would expect. The graph also shows consistent steeper growth for Wellington StudyLink recipients since 2016.

Figure 4 *Trends in mean rents ($)*

(a) Mean Rent($)Studylink Recipients v. Control 3-4 Bedroom Households

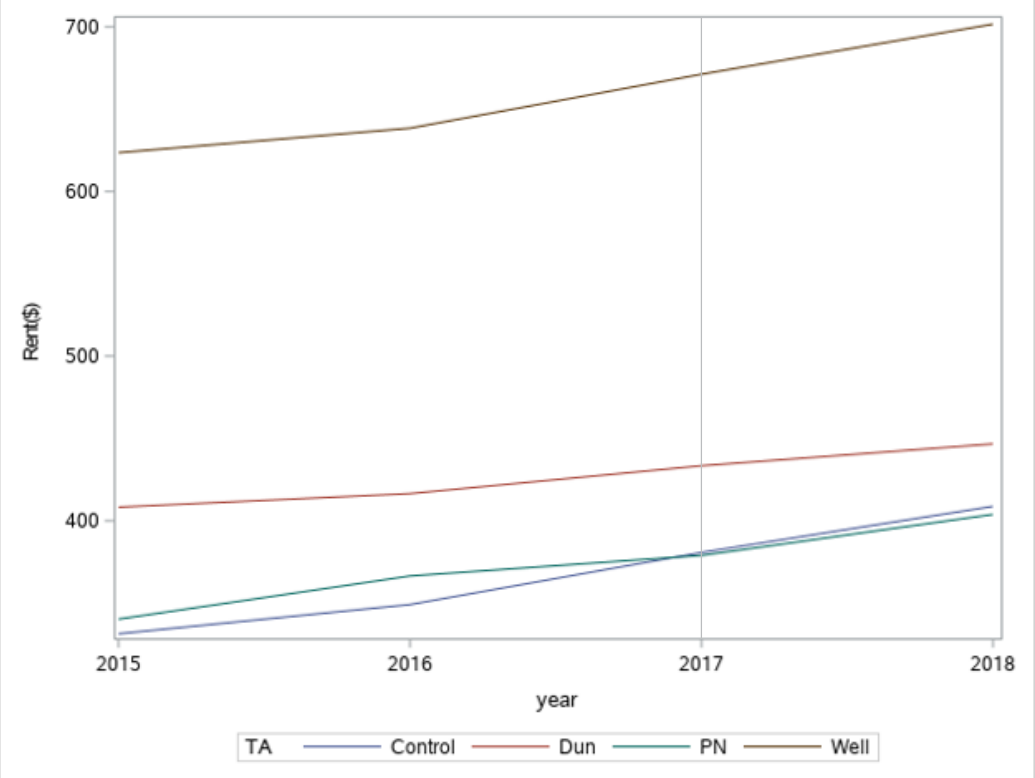
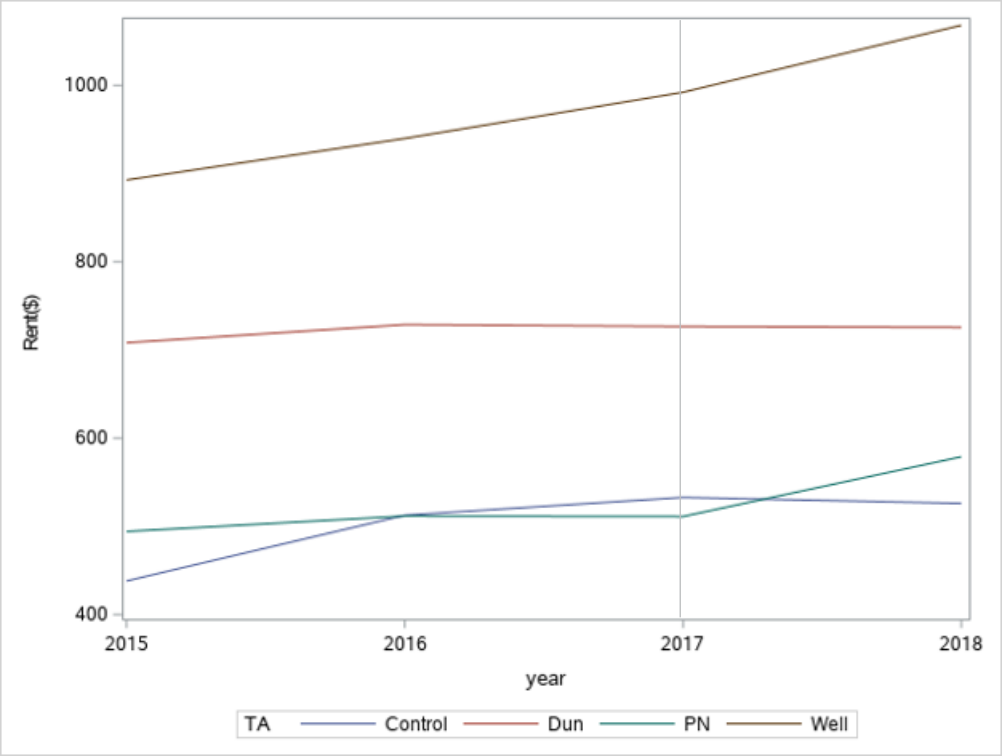


Figure 5: *Trends in mean Rents*

(b) Mean Rent($)Studylink Recipients v. Control 5+ Bedroom Households



Graph (b) shows, for the three years prior to the policy change, the treatment and control groups followed similar trends in growth — Dunedin and the control group show very similar trends, with Palmerston North following this pattern but much smaller growth, and Wellington's trends are consistently steep over the three years. Following the policy change, Wellington and Palmerston North show a steeper incline in mean rents in comparison to Dunedin and the control group.

Table 5 presents estimates of the raw difference-in-difference changes in student support payments. Each panel presents means for the per annum amount received per student in the student city of interest alongside the national average. The first panel shows the average Student Loan Living Costs received in 2018 increased for all four groups — National Average $802; Palmerston North $454.72; Wellington $506.18; Dunedin $648.32.

The second panel shows the average Student Allowance received in 2018 also increased across all four groups — National Average,$1829.50; Palmerston North, $1802.00; Wellington, $1725.52; Dunedin, $1810. The third panel shows the average Accommodation Benefit received (which is given only to students eligible for the Student Allowance) in 2018 also increased across all four groups — National Average,$537.07; Palmerston

Table 5: Summary Statistics of changes to student support payments pre-/post-2018.

	Pre	Post	Difference
1. Mean Student Loan Living Costs amount ($)			
National Average	$4, 351 (12.17)	$5, 513 (15.78)	$1, 162p.a / $29.05p.w
Palmerston North	$2, 241.96 (67.24)	$2, 696.68 (84.69)	$454.72p.a / $11.36p.w
Wellington	$2, 298.20 (22.47)	$2, 804.38 (55.38)	$506.18p.a / $12.65p.w
Dunedin	$2, 159.78 (42.9)	$2, 808.10 (52.6)	$648.32p.a / $17.10p.w
2. Mean Student Allowance ($)			
National Average	$6, 235.34 (15.44)	$8, 064.59 (19.01)	$1, 829.25p.a / $45.73p.w
Palmerston North	$6, 390.97 (80.35)	$8, 192 (99.82)	$1, 739p.a / $43.48p.w
Wellington	$6, 008.29 (48.14)	$7, 733.81 (60.18)	$1, 725.52p.a / $43.14p.w
Dunedin	$6, 364 (49.22)	$8, 174 (58.69)	$1, 810p.a / 45.25p.w
3. Mean Accommodation Benefit			
National Average	$1, 339.59 (4.35)	$1, 876.66 (6.39)	$537.07p.a / $13.43p.w
Palmerston North	$1, 373.33 (16.63)	$1, 615.69 (22.04)	$242.36p.a / $6.05p.w
Wellington	$1, 347.35 (9.90)	$1, 917.64 (13.47)	$570.p.a / $14.25
Dunedin	$1, 425.64 (8.04	$1, 916.06 (10.22	$490.42p.a /$12.26p.w
4. Mean Total Student Support*			
National Average	$8, 972.74 (80.85)	$10, 519.98 (102.44)	$1, 547.24p.a / $38.61p.w**
Palmerston North	$8, 963.79 (203.99)	$11,457 (266.81)	$2, 493.21p.a / $62.33p.w
Wellington	$8, 917.6 (128.16)	$11, 667 (163.97)	$2, 749.40p.a / $68.74p.w
Dunedin	$9, 032.67 (120.02)	$11, 701 (148.72)	$2, 668.33p.a or $66.70p.w

* Total student support includes students receiving both Student Loan Living Costs, allowance and Accommodation Benefit.
** Based on 200 weeks/ 50 year lifetime limit, which is based on an academic year of 40 weeks.

North, $242.36; Wellington, $570.29; Dunedin, $490.42 The fourth panel shows the average total student support received by students receiving payments of all three forms of financial assistance, increased, in 2018, for all four groups — National Average, $1547.24; Palmerston North, $2493.21; Wellington, $2749.40; Dunedin, $2668.32.

Table 6 presents estimates of the raw difference-in-difference changes in student rents following the policy change. Panel one shows mean rents for StudyLink recipients in 3-4 bedroom households, by city, compared to the control group. Palmerston North

Table 6: Simple difference-in-difference estimates of changes in mean rents pre-/post-2018.

	Pre	Post	Difference-in-Difference
1. Mean Rents 3&4 bedroom house			
Palmerston North	$391.25 (1.98)	$409.02 (2.08)	$17.77
Control	$372.51 (0.90)	$395.70 (0.98)	$23.19
Difference	$18.74 (1.54)	$13.32 (1.53)	**$5.41**
Wellington	$692.04 (2.55)	$745.90 (2.70)	$53.86
Control	$558.42 (1.73)	$577.13 (1.73)	$18.71
Difference	$133.62 (3.08)	$168.77 (3.11)	**$35.14**
Dunedin	$453.78 (1.44)	$452.38 (1.94)	-1.40
Control	$390.13 (1.07)	$409.38 (1.09)	$19.25
Difference	$63.65 (0.99)	$43.00 (1.84)	**$20.65**
2. Mean Rents 5+ bedroom house			
Palmerston North	$520.15 (3.02)	$592.75 (3.35)	$72.60
Control	$492.14 (6.27)	$535.39 (6.59)	$43.25
Difference	$28.01 (4.01)	$57.36 (4.45)	**$25.35**
Wellington	$1,038.95 (4.49)	$1,089.76 (4.78)	$50.81
Control	$887.79 (7.37)	$935.32 (7.67)	$47.53
Difference	$151.16 (8.64)	$154.44 (8.66)	**$4.18**
Dunedin	$742.22 (1.48)	$744.22 (2.18)	$2.00
Control	700.38 (3.95)	691.74 (4.98)	-$8.64
Difference	$41.85 (4.22)	$52.48 (5.02)	**$10.63**
No. Observations	97, 830	97, 830	

Estimated standard errors are in parentheses, Entries in bold are the difference-in-differences estimates.

and Wellington both see an increase in mean rents from 2017 to 2018. Mean rents in Palmerston North increase $17, while the control group had a slightly larger increase of $23.19; Mean rents in Dunedin 3-4 bedrooms decreased by $1.40, while the control group increased by $19.25 — implying there is no evidence that increasing StudyLink payments increased rents. However, mean rents in Wellington increased by $53.86, while the control group increased by $18.71, giving an estimated DiD policy impact of $35.14.

Table 7

Trends of student accommodation as a % of unique bonds lodged by number of bedrooms

Pre Policy (2017)				Pre Policy (2018)		
No. bedrooms	Palmerston North	Wellington	Dunedin	Palmerston North	Wellington	Dunedin
1	0.3960	0.2422	0.1902	0.6125	0.2755	0.1812
2	0.0036	0.0839	0.0243	0.0260	0.0592	0.0176
3	0.0937	0.1697	0.0621	0.0525	0.1507	0.0607
4	0.1732	0.2285	0.1465	0.1107	0.2294	0.1478
5+	0.3036	0.2757	0.5770	0.1983	0.2852	0.5927
No Obs	10,161	37,959	42,291	14,292	29,735	36,195

Panel 2 presents mean rents for StudyLink recipients in 5+ bedroom households, by city, compared to the control group. The simple estimates suggest a policy impact in each of the student cities, with a large impact of $25.35 in Palmerston North, a small impact of $4.18 in Wellington and an impact of $10.63 in Dunedin.

Table 7 presents an overview of the make-up of living arrangements for StudyLink recipients as a percentage of the total number of bonds lodged for StudyLink recipient households — by city, before and after the policy was introduced. While Table 7 provides an overview of the size of dwelling in the market (number of unique bonds lodged), Table 8 provides the average number of tenants per bedroom size dwelling for StudyLink households. The statistics displayed tell us that for Wellington 5+ bedroom households in 2017 and 2018 there was on average 6.72 and 6.57 people, respectively. This implies that while we have 8,480 bonds lodged for 5+ bedroom houses this accounts for around 55,713 (8,480*6.57) people. Meanwhile, the 2018 student population in Wellington is estimated at 28,407 (Table A) suggesting that many students flat-share with non-students, including parents who rent.

7.2. Full sample regression analysis

Table 9 presents the results of six regressions for the full sample, where the treatment group includes StudyLink recipients across 1—5+ bedroom households in Wellington, Dunedin, and Palmerston North. Results for columns 1—4 are not statistically significant. Column 1 presents results for a simple raw estimate using the Ordinary Least Squares Regression with no controls. In column 2, I control for number of

Table 8: Mean number of occupants per dwelling

	Full Sample	
	Pre	Post
1. Three Bedrooms		
Palmerston North	2.85 (0.045)	2.87 (0.047)
Wellington	4.46 (0.039)	4.16 (0.043)
Control	1.95 (0.730)	1.85 (0.74)
Dunedin	3.22 (0.032)	3.44 (0.042)
2. Four Bedroom		
Palmerston North	4.46 (0.053)	4.65 (0.057)
Wellington	5.89 (0.056)	5.54 (0.058)
Dunedin	5.46 (0.026)	5.23 (0.040)
Control	2.69 (1.03)	1.89 (1.90)
3. Five+ Bedroom		
Palmerston North	6.18 (0.054)	5.34 (0.075)
Wellington	6.72 (0.061)	6.57 (0.064)
Dunedin	6,18 (0.015)	5.83 (0.020)
Control	3.43 (0.96)	2.80 (1.72)
No. obs	76,833	76,681

bedrooms 1—5+. This results in a much smaller estimated impact to $4.36 (although the estimate is statistically insignificant) than the -$34.33 raw difference-in-difference estimate. In column 3, I control for character demographics, which increases the estimated impact further to $4.88; controls for age include dummy variables for <17, 18—22, 23—25, 26—28, >29, gender, and ethnicity which includes dummy variables for European, Māori, Pacific, and other. In column 4, I introduced controls for level of study (bachelor degree, postgraduate & honors, masters & PhD), which increases the estimated impact a further $5.36; statistically insignificant at the 10% level of significance. I then add controls for type of institution (University, Polytechnic, Wānanga), which reduces the effect to a statistically insignificant $3.70.

Table 9: Regression estimates of 2018 Student Support policy change impact on rent for all bedroom households across Palmerston North, Wellington, Dunedin.

	(1) Simple regression.	(2) Control for bedroom size	(3) Control fro demographics *(age, gender, ethnicity)*	(4) Control for level of study. *(Bachelor, Masters etc)*	(5) Control for Institution *(University, Polytech or Wānanga)*
Policy Impact 2018	-34.33**** (4.71)	4.36 (3.34)	4.88 (3.334)	5.36* (3.318)	3.705 (3.294)
Intercept	460.16**** (2.30)	496.56**** (3.741)	496.86**** (3.733)	495.79**** (3.714)	496.31**** (3.687)
Post	13.58**** (3.33)	23.28**** (2.354)	23.34**** (2.347)	23.27**** (2.33)	23.36**** (2.317)
Treatment *(StudyLink recipients in exposed city)*	100.72**** (3.18)	6.70*** (2.458)	15.94**** (6.867)	-14.62** (7.073)	-7.75 (7.252)
R-squared	0.040	0.5154	0.518	0.523	0.530
No. Observations	50,000	50,000	50,000	50,000	50,000

* p < 0.1 ; ** p < 0.05 ; *** p < 0.01 ; **** p < 0.001.
*(2) allows us to see if the policy impacted other rent prices in the city as a result of increased demand in an already tight rental market.

Overall, the full-sample regression results are inconclusive. While column 1 has a strong statically significant impact, at the 0.01% level, it estimates a large *decrease* in mean rents as a result of the policy. With the exception of column 4 — where I include controls for level of study, age, gender, ethnicity and bedroom size and estimate a, statically significant at the 10% level, policy impact of $5.36 — the Table 9 regression estimates provides insufficient evidence that an increase in weekly student support payments increased rents. Based on the results of Table 9 alone, we would fail to reject the null hypothesis.

7.3. Main regression analysis — subsample

This section presents the main regression results of this study and examines whether the policy change had different, or more concentrated, impacts across subsamples of the population. Specifically, by geography, whether some university towns were more impacted by the policy change than others; and by household size, categorised by the number of bedrooms.

Table 10: Impact of the 2018 student support policy change on rent for **3&4 bedroom** households — by city.

Mean/Quartile	Full Sample	City					
		Palmerston North		Wellington		Dunedin	
		Post Announcement	Post Implementation	Post Announcement	Post Implementation	Post Announcement	Post Implementation
(a) Policy Impact (β3)	18.36**** (3.17)	—	-7.00*** (2.32)	—	25.43**** (3.398)	—	-18.17**** (2.32)
Announcement effect (β3)	—	-3.902* (2.38)	—	21.98**** (3.45)	—	-15.61**** (2.37)	—
Intercept	497.98**** (1.328)	411.36**** (1.288)	423.60**** (1.32)	670.46 **** (1.72)	541.14 (1.79)	382.23**** (1.11)	390.69**** (1.06)
Post	19.16**** (1.891)	25.06**** (1.17)	24.61**** (1.22)	18.10**** (2.24)	23.13**** (2.45)	22.91**** (1.58)	18.71**** (1.50)
Treatment	87.61**** (6.078)	-13.869**** (2.87)	-22.53**** (2.67)	139.54**** (5.45)	180.64**** (5.88)	33.12**** (3.97)	33.66**** (5.07)
R-squared	0.083	0.145	0.1558	0.4213	0.3286	0.1484	0.1348
(b) Quantile regressions							
Q0.25	25.00 (2.91)	-5.00** (1.97)	-3.00** (1.46)	5.00* (3.138)	15.00**** (3.38)	-10.00**** (1.31)	-10.00**** (1.23)
Q0.5: Impact	45.00**** (11.27)	-5.00*** (1.73)	-17.50**** (2.31)	25.96**** (4.98)	25.00** (2.01)	-18.00**** (2.40)	-23.00**** (3.08)
Q0.75: Impact	7.00 (14.87)	-17.50**** (1.82)	-7.50**** (1.86)	32.86**** (2.53)	25.00**** (3.43)	-24.33**** (1.59)	-18.50**** (3.18)
Q0.90: Impact	0.00 (25.10)	-14.44**** (3.54)	-10.00** (5.14)	35.00**** (3.482)	36.33**** (4.14)	-20.50**** (2.447)	-20.00**** (4.33)
Q0.95: Impact	-52.00 (35.42)	-25.00**** (1.63)	-53.00((** (4.41)	58.76**** (3.31)	10.00 (3.28)	-15.79**** (4.48)	-23.00**** (4.56)
No. Observations	50, 000	16, 578	17, 046	36, 594	40,107	24, 015	26, 889

Notes: All regressions include controls for year-specific dummy variables, recipient characteristics, and area fixed effects. Standard errors in parentheses, adjusted for clustering at the claimant level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Table 11: Impact of the 2018 student support policy change on rent for **5+ bedroom** households — by city.

Mean/Quartile	Full Sample	City					
		Palmerston North		Wellington		Dunedin	
		Post Announcement	Post Implementation	Post Announcement	Post Implementation	Post Announcement	Post Implementation
(a) Mean Regressions Policy Impact (β_3)	12.90 (10.47)	—	19.34**** (10.61)	—	30.25*** (12.38)	—	22.29*** (8.69)
Mean Regressions Announcement effect (β_3)	—	7.15 (11.092)	—	62.07**** (15.16)	—	59.15 ** (23.02)	—
Intercept	750.36**** (6.95)	533.02**** (7.55)	501.58**** (6.09)	816.00**** (10.88)	858.15**** (8.16)	604.45**** (20.92)	699.45**** (3.95)
Post	41.99**** (10.22)	10.04 (10.22)	28.53*** (8.92)	13.44 (14.63)	24.66*** (11.62)	-65.29*** (24.67)	-10.25*
Treatment	70.11**** (10.29)	8.35 (8.84)	-9.93 (13.15)	161.19**** (13.81)	182.95**** (10.58)	123.99**** (20.30)	116.76**** (30.27)
R-squared	0.048	0.0341	0.1022	0.0961	0.1344	0.0368	0.0306
(b) Quantile regressions							
Q0.25: Impact	25.00**** (2.93)	2.42 (10.66)	50.00**** (11.34)	50.00**** (3.85)	-5.00 (11.42)	65.00**** (16.63)	35**** (9.57)
Q0.5: Impact	45.00**** (12.84)	22.00**** (6.24)	35.00**** (7.80)	60.00**** (16.78)	35.00**** (9.27)	55.00**** (16.7401)	27.12**** (8.62)
Q0.75: Impact	7.00 (14.23)	10.00 (16.93)	40.00**** (9.95)	85.00**** (13.99)	25.00*** (10.37)	183.00**** (19.84)	44.00**** (8.49)
Q0.90: Impact	0 (24.87)	55.00*** (23.46)	70.00**** (5.18)	95.00**** (11.52)	15.00 (15.76)	290**** (38.16)	64.00**** (11.26)
Q0.95: Impact	-52.00* (36.91)	-50.00 (10.24)	80.00*** (28.75)	55.00**** (8.53)	-6.00 (10.80)	254.00**** (46.19)	45.00**** (12.39)
No. Observations	30, 858	47,166	49,776	19,491	13, 917	42,711	29, 688

Notes: All regressions include controls for year-specific dummy variables, recipient characteristics. Standard errors in parentheses, adjusted for clustering at the claimant level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Table 10, presents regression results,[22] by city, for 3-4 bedroom properties. The full sample regression results for the 12 months post January 2018, shows a statistically significant policy impact of $18.36. When we separate the regressions out by city, we can see that the policy impact is attributed almost entirely in Wellington city. The results for Palmerston North showed that the increase of rents was $7 less than the control group (significant at the 1% level). For Dunedin 3-4 bedroom households, the results showed statistically significant estimates at the 0.01% level of -$15.61 post announcement and -$18.17 post-policy implementation. We see from the mean rents for the period in Table 6, that while there was an increase in the mean rents for the control group rents in the treatment group was almost unchanged — this result shows that mean rents in the control group increased $15.61 more than the treatment, while the treatment (Dunedin) remained unchanged. Therefore, from the regression estimates in Table 10, we can conclude that there is no evidence an increase in weekly student support payments increased rents for recipients in 3-4 bedroom households in Palmerston North or Dunedin. However, there is strong statistically significant evidence that there was a strong effect for StudyLink recipients living in Wellington.

The Wellington city DiD estimate, for 3-4 bedroom properties, shows a statistically significant (at the 0.1% level) policy impact of an increase in mean rents of $25.45 for the 12-months post policy. The regression results also estimate an announcement effect of $21.98[23] for the 12 months following the policy's announcement on 21 November 2017. Assuming that the average increase in rents will be split across the 3 or 4 other rooms in the household, the regression results suggest that, in Wellington, around 10.57% of the increased accommodation support passed through to higher rental costs on average for the 12 months following the policy taking effect; i.e. ($25.45/$68.74)/ 3.5. If we were to make the same estimate for the mean rent of the property we would estimate 37%; i.e. ($25.45/$68.74).

22 While the results presented in Table 10 and Table 11 present estimates in level specifications ($) for rent, log(rent) results are comparable — See Appendix Table 14 and Table 15.

23 It is important to read these results in the context of the common student flat-share living arrangements. The value of per-week mean rents, used in this study and provided through the bond lodgment form, are for the whole house. However, students typically rent by the room in a flat-share situation with other students or young professionals, or board,where rent is often split per room. This has two important implications (1) that in a four bedroom house you could have 4 students each receiving the increase, or only 1 student receiving the increase. (2) Total rent is divided between the flatmates/rooms. Due to the nature of the administrative data provided through the Tenancy Bond Lodgment form,there is no reliable data that would tell us how many StudyLink recipients lived in each property and what their individual weekly rent is for their room. For this reason, this paper provides two estimates — a conservative estimate where the policy impact is divided across the mean number of rooms, and a liberal estimate which is the policy effect/rent increase for the full property.

Table 11 presents regression results for 5+ bedroom properties by city. The full sample results show a statistically insignificant increase in mean rents of $12.90. In Palmerston North, the estimates show a statistically insignificant increase of $7.15 post announcement, but a statistically significant (at the 0.01% level) increase in mean rents of $19.34 for the 12 months following the policy being implemented. The regression results suggest that for Palmerston North 5+ bedroom properties, on a per-room basis, about 6.2% of the increased accommodation support passed through to landlords in the form of higher rent for the 12 months following the policy taking effect; i.e. ($19.34/$62.33) / 5. If we were to make the same estimate for the mean rent of the property we would estimate 31%; i.e. ($19.34/$62.33), which is in line with the Wellington 3-4 bedroom property estimates.

For Wellington 5+ bedroom properties, estimates show a large statistically significant effect for both post announcement, $62.07 and implementation $30.25. The regression results suggest that, in Wellington 5+ bedroom households, about 8.8% of the increased accommodation support passed through to landlords in the form of higher rental costs for the 12 months following the policy taking effect; i.e ($30.25/$68.74)/5; and a substantial policy effect of 18% [($30.25/$68.74)/5] for the 12 months following the policy being announced. If we were to make the same estimate for the mean rent of the property we would estimate 44%; i.e. $30.25/$68.74.

Estimates of the policy impact for Dunedin 5+ bedroom properties shows a statistically significant (at the 1% level) policy impact of $22.29. These estimates also indicate a large announcement effect of $59.15 (significant at the 5% level). Assuming again that the average increase in rents will be split across the 5 bedrooms in the household, the results suggest that about 6.7% of the increase was passed onto landlords in the form of higher rent for the 12 months following the policy taking effect and around 17.76% for the 12 months following the announcement; i.e. ($22.29/$66.70)/5 and ($59.15/$66.70)/5. Overall, the results presented in Table 11, find statistically significant evidence of a strong policy effect for StudyLink recipients in 5+ bedroom households across all three student cities.

The demographic statistics presented earlier in Table 7, could help shed some light onto why we see an increase in rents in Wellington for 3-4 bedroom properties, but not Dunedin 3-4 bedroom properties; while we see an increase in Dunedin 5+ bedroom house-

holds. The results in Table 7 suggest simple supply and demand could help explain these results. In 2018 Wellington, 15.07% of student flats were three bedrooms, 22.94% were 4 bedrooms (total 38%), and 27.57% were 5+ bedroom properties. Meanwhile in Dunedin, 6.07% of student flats were three-bedroom properties and 14.78% were 4 bedroom properties (total 20.85%) and 59.27% were 5+ bedroom properties. In Palmerston North, where no significant impact was found for 3-4 bedroom households, only 16% of bonds lodged were for 3-4 bedroom properties and 19.83% were 5+ bedrooms. The concentration of students living in the properties most impacted by the policy could therefore point to the preexisting balance of supply and demand in the market as a significant factor in whether the policy resulted in driving up student rents.

While this study includes a number of controls and a reasonably large sample size, the R-squared (coefficient of determination) of the various regressions presented in Table 10 and Table 11 are small and range from 0.048-0.32. This is somewhat expected from a DiD model estimating rents, because there are numerous factors that influence rents in a neighborhood, which can't always be accounted for in the model through controls. There are similar studies that also present R-squared for rent-related regressions that indicate that variances are not sufficiently explained by the model (Gibbons and Manning, 2006). One additional control that was not included, and may have had an impact on R-squared would have been the inclusion of an explanatory variable for total household income. However, the dataset does not include this information. Another option would have been to include an explanatory variable for total weekly student support payments, however it's unlikely there is enough variation in these payments for it to have much impact on R-squared. Other factors that could be helpful in predicting rent, is age of the property, square-feet, number of bathrooms, street appeal, and parking options.

7.4 Quantile Regression

The quantile rents presented in Table 10 and Table 11 show estimates consistent with what we would expect in that the rent impact is felt more so in the higher quantiles of the rent distribution. The weekly rent increases in Wellington 3-4 bedroom households range from $15[24] at the 0.25 quantile, $25 at the medium and $36.33 at the 0.90 quantile.

24 For quantile regressions I focus on absolute dollar values, however log(rent) results are comparable.

Table 12: Regression estimates of the impact of the policy change on household crowding

	Full Sample	Palmerston North		Wellington		Dunedin	
		3-4	5+	3-4	5+	3-4	5+
Impact	-0.045 (0.125)	-0.594**** (0.0544)	-0.404*** (0.156)	-0.2299**** (0.018)	0.798**** (0.166)	-0.413**** (0.049)	-0.071* (0.053)
Intercept	5.387**** (0.061)	2.629**** (0.026)	3.816**** (0.098)	1.245**** (0.009)	6.26**** (0.097)	2.834**** (0.025)	3.733**** (0.031)
Treatment	0.953**** (0.071)	1.5544**** (0.06254)	2.414**** (0.314)	0.063*** (0.025)	3.579**** (0.468)	2.476**** (0.054)	2.531**** (0.061
Post18	-0.307** (0.122)	-0.01897 (0.02621)	-0.043 (0.140)	-0.008 (0.012)	-0.951**** (0.141)	-0.023 (0.024)	-0.335* (0.183)
R-Squared	0.0144	0.3560	0.222	0.151	0.029	0.470	0.242
No.Obs	50,000	23, 901	3, 291	37, 734	9, 153	17, 211	17, 913

Notes: Full sample includes all controls for city, dwelling size, degree level, institution type and demographic characteristics. All regressions include controls for year-specific dummy variables, recipient characteristics. Standard errors in parentheses, adjusted for clustering at the claimant level. * p < 0.1 ; ** p < 0.05 ; **** p < 0.01 ; ***** p < 0.001.

For 5+ bedroom households in Palmerston North and Wellington, however, this pattern is less obvious. Wellington 5+ estimates range from -$5 at the 0.25 quantile, $35 at the medium and $15 at the 0.90 quantile. For Palmerston North, estimates range from $50 at the 0.25 quantile, $35 at the medium and $70 at the 0.90 quantile. For Dunedin, estimates range from $35 at the 0.25 quantile, $27.12 at the medium and $64 at the 0.90 quantile.

7.5 Household Crowding

Table 12 presents the results for difference-in-difference regression estimations by city and the sub-category for number of bedrooms. Table 12 presents a statistically significant decrease in tenant count for all cities and household size with the exception of Wellington 5+ bedroom households. For 3-4 bedroom households in Palmerston North, Wellington, and Dunedin the results suggest that the policy reduced household crowding in student rentals. Despite the coefficients not being larger than 1 (i.e being less than 1 person), the statistically significant negative coefficients are consistent with a decrease in crowding. Therefore, from these estimates, it suggests that students likely used some of the increase in student support payments to seek out higher quality and/or less crowded housing.

Table 13: Wellington 3-4 January 2018

Implied marginal propensities to spend and income elasticities

Mean or Quantile	Student Support Income		Rental Payments		Implied:	
	2018 (1)	Total Change (2)	2018 (3)	Policy Impact (4)	MPS on Rent (5)	Income Elasticity (6)
Mean	291.68	68.74	$745.90	25.43****	0.37	0.14
Q 0.25	145.04	70.54	$504.37	15.00****	0.21	0.06
Q 0.50	284.20	68.62	620.95	25.00**	0.36	0.17
Q 0.75	414.75	95.85	741.93	25.00****	0.26	0.15
Q 0.90	509.08	103.51	840.75	36.33****	0.35	0.21
Q 0.95	570.60	113.96	908.76	10.00	0.09	0.06

7.6 Robustness Analysis

To ensure our results aren't heavily influenced by city specific factors, I look at three major university towns, rather than focus on just one. To ensure that the control group isn't skewed by city specific factors I used an aggregate of four cities across New Zealand where there is no major university, and include non-student households from the student city of interest. To ensure that the policy did not have any effects on non-student rents, I ran regression where all households in the student city, by city, were included in the treatment group and found a small statistically insignificant effect. If the policy were to impact rents of students we can expect to see that take effect in cities that are well-known for being university cities and heavily populated by young students living away from home. Wellington has two major universities as well as multiple polytechnics in the CBD.

Outliers were trimmed from the sample where the result was larger than three standard deviations from the mean, and in all cases, this was in the 99 percentile. This meant that any increase in mean rents was not influenced by outliers of a few rare expensive and/or luxury apartments.

To ensure the common trends assumption (also known as parallel trends) holds, I run the same regressions as presented in Table 11 and Table 10 on the two years prior to the policy announcement date. I create dummy variables for Pre (21 November 2015—20 November 2016) and Post (21 November 2016—20 November 2017). The coefficient results show a small and insignificant effect. This satisfies a test of the common trends assumption and suggests the common trends assumption is met.

7.8 Interpretation

Table 13 follows Hyslop and Rea's (2019) method of presenting estimates for marginal propensity to spend (MPS) (column 5) and income elasticities (column 6). The MPS on housing is estimated as the increase in mean and quantile rental payments in 2018 relative to the difference-in-difference regression impact (Table 10 and Table 11); i.e. column (5)=(4)/(2). The income elasticities are estimated using the difference-in-difference regression impact relative to the mean and quantile rental payments for the one year following the policy taking effect (01 January 2018—31 December 2018); and the change in StudyLink student support payments relative to the mean and quantile StudyLink student support payments for the one year following the policy taking effect – i.e. column (6)=[(4)/(3)]/[(2)/(1)]. For these estimates, I only look at the 12 months following the policy taking effect and exclude the announcement date effect as there was no change in student support entitlements until 01 January 2018.

A MPS of 37%, as shown in Table 13, is similar to what we would expect based on results of similar studies (Hyslop and Rea, 2018), (Grimes & Hyland, 2013) (Viren, 2013), (Gibbons & Manning, 2006). However, because students generally flat-share with other students or young adults on a per-room basis, the MPS of 37% is possibly quite a liberal estimate of the true landlord capture; a more conservative estimate would, therefore, be found by dividing column (4), the increase in rent for the house, by the number of rooms (take the average 3.5) and you have a MPS of 10.57%. This MPS implies that for every $1 increase in weekly student support payments $10.57 was passed on to landlords. The estimates are consistent across Palmerston North, Wellington and Dunedin[25] 5+ bedroom households, with MPS results of 0.31, 0.44 and 0.33 respectively.

The elasticity of housing expenditure with respect to income estimate, in Table 13, is about 0.14, which means that for every 10% increase in student cash benefits, we can expect the amount paid in rent to increase by 14%. This is quite low in comparison to other studies. Hyslop and Rea (2018) found an elasticity of 0.55, the large difference in their estimates to ours could be in part explained by the large difference in the increased weekly student support payments. ($66 in our study as opposed to their $6.81 estimated increase in accommodation-related support payments). The low estimate may also be a

25 Tables presenting implied marginal propensities to spend and income elasticities for Palmerston North, Wellington and Dunedin 5+ bedroom households are included in the Appendix — see Tables 16-18.

reflection of the flat-share living arrangements common to students. For example, if a landlord were to increase all 3-4 tenants rent by $68.75 (column 2) per week this would be seen as excessive.

Grimes & Hyland (2013) estimated income elasticity of housing expenditure to be 0.0348-0.0379. Duesenberry and Kisten (1953) estimated income elasticity of housing expenditure to be 0.15. Kangasharju (2010) study, which looked into the effect of a housing allowance programme on the rent paid by assisted low-income households, estimates that the elasticity of rent with respect to allowance is 0.31. Mulford (1979) estimates rental housing income elasticities at 0.19 in Wisconsin and Indiana, USA.

8. Conclusions

Our analysis shows that conservative estimates of the policy impact suggest that 6.2-10.57% of the increase in the StudyLink Student Loan Living Costs, Student Allowance and Accommodation Benefit was absorbed by higher rental costs. This statistically significant effect is concentrated in Wellington 3-4 and 5+ bedroom properties, and Dunedin and Palmerston North 5+ bedroom properties. While conservative estimates are based on the assumption of a per-room flat-share living situation, liberal estimates of landlord capture between 0.31-0.44 are calculated based on the DiD estimates for the increase in rent for the full property. The results also suggest there is no evidence that an increase in weekly student support payments increased rents for recipients in 3-4 bedroom households in Palmerston North or Dunedin.

The DiD regression results for household crowding, provide compelling evidence that suggests some portion of the increase in rent is at least in part due to recipients being able to seek out and afford better quality and less crowded housing. However, based on the administrative data used, it is not possible to estimate to what extent the increase is due to landlords increasing rents compared to recipients choosing better quality housing

In conclusion, the results estimate that, on average, StudyLink recipients in Palmerston North 5+ bedroom properties, Wellington 3-5+ bedroom properties, and Dunedin 5+ bedroom properties benefited from the increase in weekly payments in the form of higher disposable income after housing costs of 63-89%. While students living in Palmerston North or Dunedin 3-4 bedroom properties benefited up to 100% from the increase in weekly payments in the form of higher disposable income after housing costs.

References

Albouy, D., Ehrlich, G., & Liu, Y. (2016) Housing demand, cost-of-living inequality, and the affordability crisis. Technical Report. National Bureau of Economic Research Working Paper 22816.

Amman, W. (2012): Investment in housing - the case for supply-side subsidies. *Housing Finance International, (26)* 3, 31-33.

Anastasiadis, S., Anwar, N., Benny, V., Lee, W., MacCormick, C., Smith, C., & Vandenbroucke, B., (2018). *Measuring the wellbeing impacts of public policy: social housing: Using linked administrative and survey data to evaluate the wellbeing impacts of receiving social housing* (SIA Working Paper). Retrieved from Social Invesment agency website: https://sia.govt.nz/assets/Uploads/Measuring-the-wellbeing-impacts-of-public-policy-social-housing.pdf

Ashenfelter, O., & Card, D. (1985). Using the longitudinal structure of earnings to estimate the effect of training. *The Review of Economics and Statistics*, (67)4, 648-660.

Author(s): Michael P. Murray. (1983). Subsidized and Unsubsidized Housing Starts: 1961-1977. *The Review of Economics and Statistics, 65,* (4), 590-597

Bertrand, M., Duflo, E., Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *Q. J. Econ. 119*(1), 249–275.

Blundell, R., Dias, M. C., Meghir, C., & Van Reenen, J. (2004). Evaluating the employment impact of a mandatory job search program. *Journal of the European Economic Association, (2)*4, 569–606.

Boianovsky, M., & Hoover, K. D. (2009). The Neoclassical Growth Model and Twentieth-Century Economics. *History of Political Economy, 41*(1), 1–23. doi: 10.1215/00182702-2009-013

Brackertz, N., De Silva, A., & Fotheringham, M. (2015). *2015). Literature review on the impact of demand-side housing subsidies on the housing market.* AHURI Research Paper.

Brewer, M., Browne, J., Emmerson, C., Hood, A., Joyce, R. (2015). The Incidence of Targeted Housing Subsidies: Evidence from Reforms to UK Housing Benefit.

Card, D,. & Krueger, A. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jerseyand Pennsylvania. *The American Economic Review, 84,* (4), 772-793.

Card, D., & Krueger, A. B. (1994). Wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania. *American Economic Review, 84,* 772–793

Cheung, C. (2011). *Policies to Rebalance Housing Markets in New Zealand* (OECD Economics Department Working Papers). doi: 10.1787/5kg8gj13xxf5-en

City Strategy Committee. (2017, March 02). Ordinary Meeting Of City Strategy Committee Agenda. *Wellington City Council.* Retrieved from https://wellington.govt.nz/~/media/your-council/meetings/committees/city-strategy-committee/2017/03/02/2017-march-02---csc-agenda.pdf

Cook, F., & Campbell, G. (2018, January 23). 100 complaints over Wellington rental prices. *New Zealand Herald.* https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11979817

Cooke, H. (2018). Student allowance boost blamed for rent spikes. Retrieved from https://www.stuff.co.nz/national/politics/100485600/student-allowance-boost-blamed-for-rent-spikes

Cox, W., & Pavletich, H. (2019). *Demographia international housing affordability survey.*Retrieved from http://demographia.com/dhi2019.pdf

Demographia. (2019). 15th Annual Demographia International Demographia International Housing Affordability Survey: 2018 rating middle-income housing affordability. Retrieved from http://www.demographia.com/dhi.pdf.

Duesenberry, J. S., & Kisten, H. (1953).The role of demand in the economic structure. In W. Leontief (Eds.), *Studies in the structure of the American economy*. Oxford University Press.

Dykes, P. (2016). The quasi-market approach: the answer for social housing in New Zealand? *Policy Quarterly,* 12(2). https://doi.org/10.26686/pq.v12i2.4594

Eriksen M. D., & Ross, A. *(2015)*. Housing vouchers and the price of rental housing. *American Economic Journal: Economic Policy*, 7(3), 154–176.

Fack, G. (2006). Are housing benefit an effective way to redistribute income? Evidence from a natural experiment in France. *Labour Economics*, *13*(6), 747–771.

Fallis, G,. & Lawrence, S. (1984). Uncontrolled Prices in a Controlled Market: The Case of Rent Controls. *The American Economic Review, 74,* (1), 193-200.

Geoffrey Carliner. (1973). Income elasticity of housing demand. *The Review of Economics and Statistics, (55)*4, 528-532.

Global house prices. (2017, March 09). *The Economist*. Retrieved fro https://www.economist.com/graphic-detail/2017/03/09/global-house-prices?fsrc=scn%2Ftw%2Fte%2Fbl%2Fed%2F

Grimes, A., Hyland, S., Coleman, A., Kerr, J., & Collier, A. (2013, February 24). A New Zealand Regional Housing Model . Motu Economic and Public Policy Research

Working Paper 13-02, Available at SSRN: https://ssrn.com/abstract=2223757 or http://dx.doi.org/10.2139/ssrn.2223757

H0, L.-S. (1988). Towards an optimal public housing policy. *Urban Studies*, 25, 204-211. https://doi-org.ezproxy.massey.ac.nz/10.1080/00420988820080291

Hanushek, E. A., & Quigley, J. M. (1980). What is the Price Elasticity of Housing Demand? *The Review of Economics and Statistics, 62*(3), 449. doi: 10.2307/1927113

Hickman, P., Kemp, P. A., Reeve, K., & Wilson. I. (2017). The impact of the direct payment of housing benefit: evidence from Great Britain. *Housing Studies. (32)*8, 1105–1126.

Hills, J. (2007). *Ends and means: The future roles of social housing in England.* CASEreport. 34. ISSN 1465-3001

Hipkins, C,. (2017). Government delivers big boost for students. Retrieved from https://www.beehive.govt.nz/release/government-delivers-big-boost-students

Hipkins, C. (2017). 80,000 people eligible for fees free. Retrieved from https://www.beehive.govt.nz/release/80000-people-eligible-fees-free

Hoynes, H., Schanzenbach,D.W., & Almond, D. (2016). Long-Run Impacts of Childhood Access to the Safety Net. *American Economic Review*, (106)4: 903–934.

Hyslop, D. R., & Rea, D. (2018). In: Do Housing Allowances Increase Rents? Evidence from a Discrete Policy Change. Motu Economic & Public Policy Research Working Paper 18-10.

Hyslop, D.R., & Rea, D. (2019). Do housing allowances increase rents? Evidence from a discrete policy change. *Journal of Housing Economics.* https://doi.org/10.1016/j.jhe.2019.101657

Ihlanfeldt K. R. (1982). Income elasticities of demand for rental housing: additional evidence. *Urban Studies, (19)*1, 65-69.

Jacobs, K. (2015). A reverse form of welfarism: some reflections on Australian housing policy. *Australian Journal of Social Issues, 50*(1), 53–68. doi: 10.1002/j.1839-4655.2015.tb00334.x

Johnson, J., Howden-Chapman, P., Eaqub, S. (2018). *A Stocktake of New Zealand's Housing.* Ministry of Business, Innovation and Employment.

Kemeny, J. (1995). From public housing to the social market - rental policy strategies in comparative perspective. Routledge. London

Kemp, P. (2000) The role and design of income related housing allowances. *International Social Security Review*, *53*(3), 43–57.

Laferrere, A., & Le Blanc, D. (2004) Gone with the windfall: How do housing allowances affect student co-residence? *Economic Studies*, *(50)*, 451– 77.

Leeuw, F, D,. & Ekanem, N,F. (1971). The Supply of Rental Housing. *The American Economic Review, 61*(5), 806-817

Morrison, P. S. (1995). The geography of rental housing and the restructuring of housing assistance in New Zealand. *Housing Studies, 10*(1), 39–56. doi: 10.1080/02673039508720808

Mulford, J.E. (1979). *Income Elasticity of Housing Demand*. RAND Corporation. Available from https://www.rand.org/pubs/reports/R2449.html. Also available in print form.

New Zealand Productivity Commission. (2012). *Housing affordability inquiry.* Wellington, N.Z. Retrieved from https://www.productivity.govt.nz/assets/Documents/9c8ef07dc3/Final-report-Housing-affordability.pdf

Nordvik, V., & Sørvoll, J. (2014). Interpreting housing allowance: the Norwegian case. *Housing, Theory and Society,* (31)3, 353–367.

Nunns, P. (2019). *The Causes And Economic Consequences Of Rising Regional Housing Prices In New Zealand* (Centre For Applied Research In Economics. Working Paper NO. 005). Retrieved from The University of Auckland website: https://cdn.auckland.ac.nz/assets/auckland/business/our-research/docs/care/the-causes-and-economic-consequences-of-rising-regional-housing-prices-in-new-zealand.pdf

Official Information Act. (2018, June 27). New Zealand Treasury. Retrieved from https://treasury.govt.nz/sites/default/files/2018-07/oia-20180225.pdf

Oxley, M. (2007) *Social housing versus housing allowances: what determines the result?*, ENHR Conference, June, Rotterdam.

O'Sullivan, E. & Decker, P. de. (2007). Regulating the private rental housing market in Europe. *European Journal of Homelessness, 1*, 95–117.

Poterba, J. (1984). Tax subsidies to owner-occupied housing: an asset-market approach. *The Quarterly Journal of Economics, 99*(4), 729–752.

Sa-Aadu, J. (1984). Another look at the economics of demand-side versus supply-side strategies in low-income housing. *Real Estate Economics, 12*(4), 427-460

Sayag, D., & Zussman, N. (2020). Who benefits from rental assistance? Evidence from a natural experiment. *Regional Science and Urban Economics, 80*. doi:10.1016/j.regsciurbeco.2018.09.002

Sims, D. P. (2007). Out of control: What can we learn from the end of Massachusetts rent control? *Journal of Urban Economics, 61*(1), 129–151. doi: 10.1016/j.jue.2006.06.004

Sinai, T., & Waldfogel, J. (2005). Do low-income housing subsidies increase the occupied housing stock? *Journal of Public Economics, 89*(11-12), 2137–2164. doi: 10.1016/j.jpubeco.2004.06.015

Sinai,T., & Waldfogel, J. (2005). Do low-income housing subsidies increase the occupied housing stock? *Journal of Public Economics* 89, 2137 – 2164. doi:10.1016/j.jpubeco.2004.06.015

Snow, J. (1856). Cholera and the water supply in the south districts of London in 1854. J*ournal of Public Health and Sanitary Review*, 2, 239–257. Retrieved from http://www.ph.ucla.edu/epi/snowcholerawatersouthlondon.html.

Statistics New Zealand (2014). *2013 Census QuickStats about housing.* Retrieved from http://archive.stats.govt.nz/~/media/Statistics/Census/2013%20Census/profile-and-summary-reports/quickstats-about-housing/quickstats-housing.pdf

Statistics New Zealand. (2013). *2013 Census totals by topic.* Retrieved from http://archive.stats.govt.nz/Census/2013-census/data-tables/total-by-topic.aspx#gsc.tab=0

Statistics New Zealand. (2020). *2018 Census totals by topic – national highlights (updated)*. Retrieved from https://www.stats.govt.nz/information-releases/2018-census-totals-by-topic-national-highlights-updated

Stegman, M. A., & Sumka, H. J. (1978). Income elasticities of demand for rental housing in small cities. *Urban Studies*, *(15)*1, 51-61.

Stroombergen, A. (2004). The Effects of the Accommodation Supplement on Market rents. Centre for Social Research and Evaluation Te Pokapū Rangahau Arotaki Hapori Working Paper 02/04.

Susin, S., 2002. Rent vouchers and the price of low-income housing. *Journal of Public Economics 83*, 109– 152.

Thorns, D, C. (2006).The remaking of housing policy: the New Zealand housing strategy for the 21st century. *Housing Finance International, 20–28.*

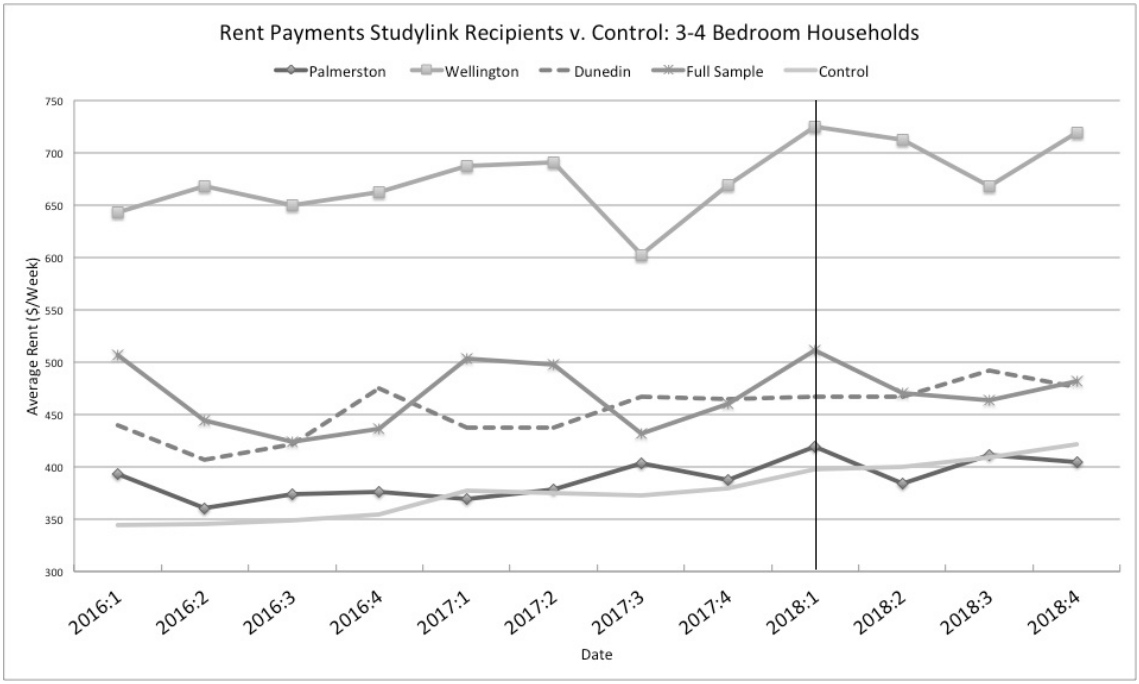
Viren, M. (2013) 'Is the housing allowance shifted to rental prices?', *Empirical Economics, 44*(3), 1497-1518.

Waldfogel, J. (1998). The family gap for young women in the United States and Britain: Can maternity leave make a difference. *Journal of Labor Economics, (16)*3, 505–545

Wood, M. Turnham, J. & Mills, G. (2008) Housing affordability and family well-being: results from the housing voucher evaluation. *Housing Policy Debate*, *19*(2): 367-412.

Appendix

Figure 6: Quarterly trends in mean rents



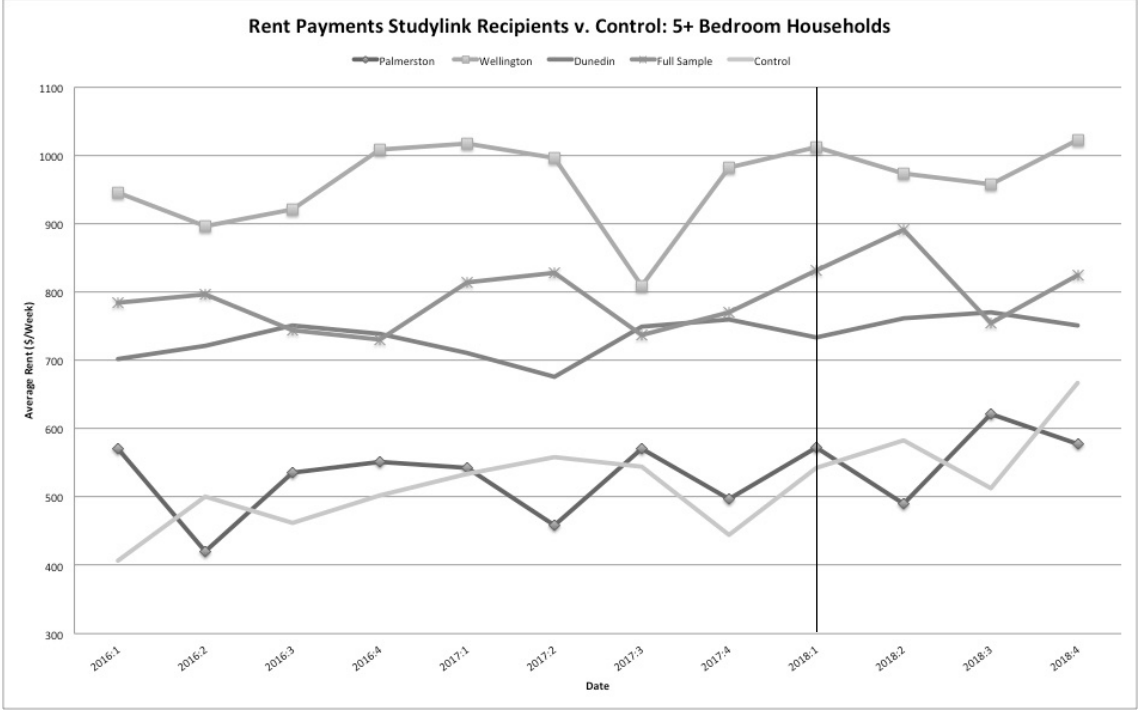
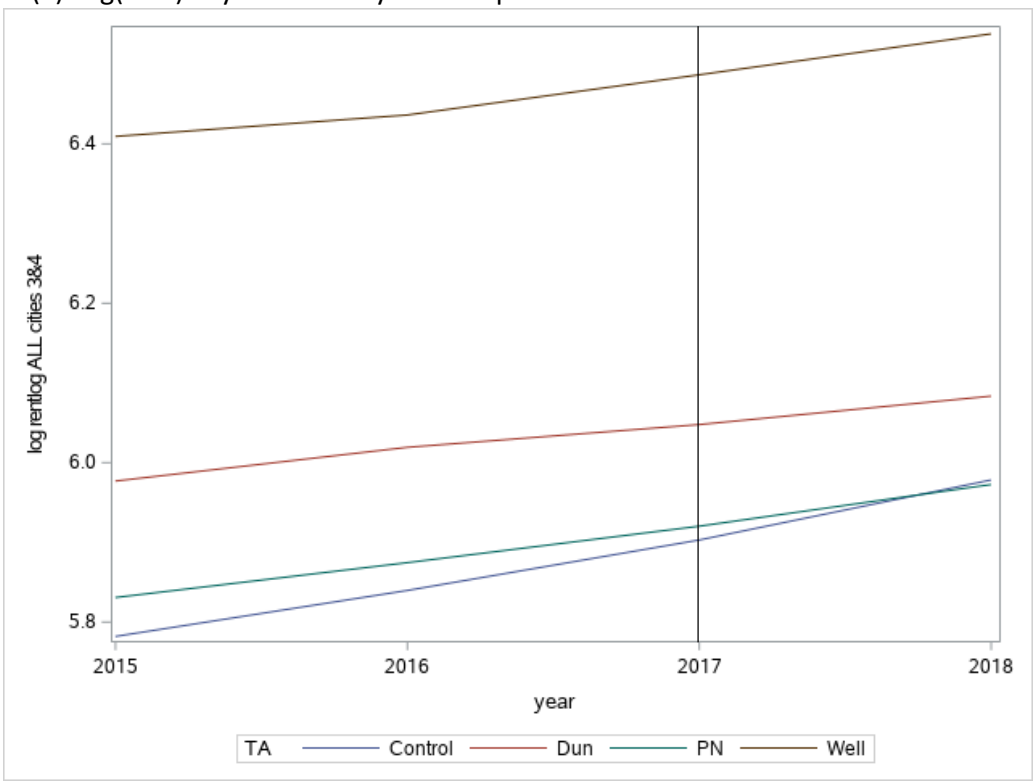


Figure 6- Graphs (a) and (b) show quarterly trends of rent payments over time, from 2016-2018. (a) presents trends for 3-4 bedroom households , while (b) presents trends for 5+ bedroom households. Figure 7 shows the log rents for students by city and control group. (a) and (d) show the yearly mean logrents from 01 January 2015—31 December 2018.

Figure 7: Trends in log(rent)

(a) Log(rent) Payments StudyLink Recipients v. Control: 3-4 Bedroom Households



(b) Log(rent) Payments StudyLink Recipients v. Control: 5+ Bedroom Households

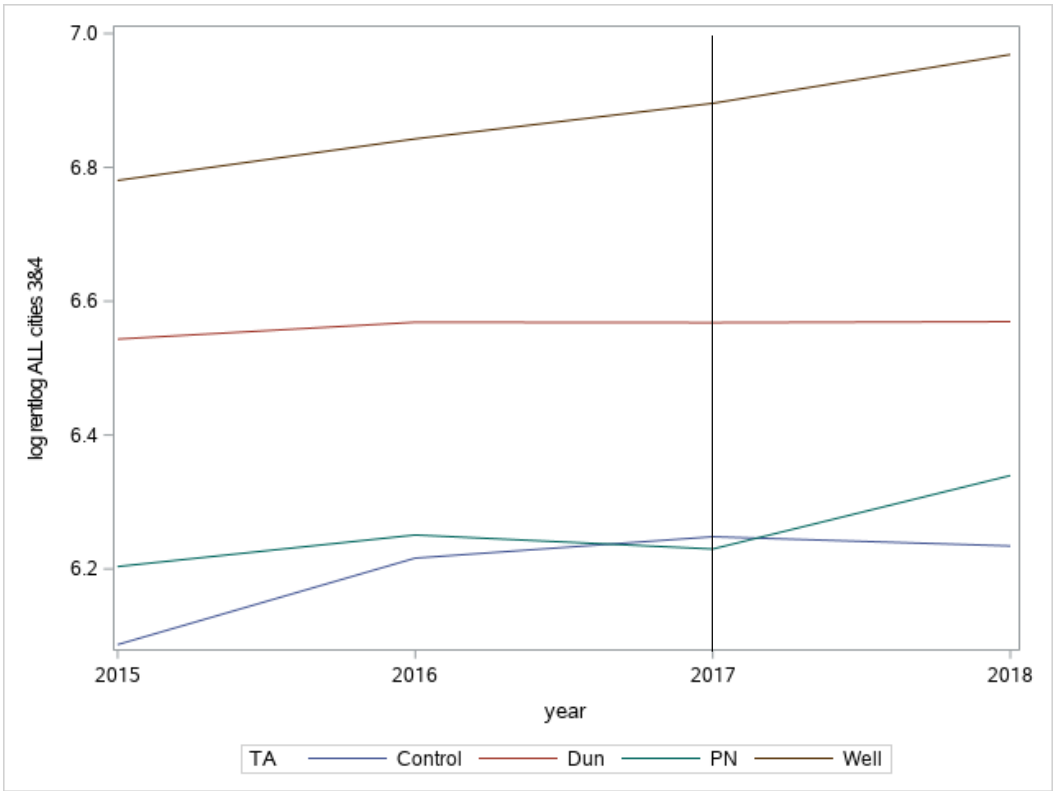


Table 14: Impacts of 2018 Student Support policy change on *logrent* **3&4 bedroom** households– by city.

Mean/Quartile	Full Sample	City					
		Palmerston North		Wellington		Dunedin	
		Post Announcement	Post Implementation	Post Announcement	Post Implementation	Post Announcement	Post Implementation
(a) Mean Regressions Policy Impact (β3)	0.0172** (0.006)	—	-0.016* (0,007)	—	0.019**** (0.005)	—	-0.044**** (0.007)
Mean Regressions Announcement effect (β3)	—	-0.014** (0.006)	—	0.0126**** (0.006)	—	-0.01397** (0.00620)	—
Intercept	6.152**** (0.003)	5.999**** (0.003)	6.008**** (0.003)	6.43**** (0.003)	6.423**** (0.003)	5.99**** (0.00335)	5.94**** (0.003)
Post	0.042**** (0.004)	0.065**** (0.003)	0.0608**** (0.003)	0.036**** (0.004)	0.0464**** (0.00423)	0.06514**** (0.00306)	0.049**** (0.004)
Treatment	0.165**** (0.012)	-0.029**** (0.008)	-0.023 (0.011)	0.28**** (0.009)	0.353**** (0.009)	-0.02931**** (0.00705)	0.075**** (0.013)
R-squared	0.079	0.140	0.134	0.310	0.273	0.1398	0.0935
(b) Quantile regressions							
Q0.25	0.0392**** (0.0075)	-0.036**** 0.005)	-0.010* (0.005)	-0.0173* (0.0079)	0.0139** (0.0058)	-0.0360**** (0.005)	-0.0329**** (0.004)
Q0.5: Impact	0.0571**** (0.0145)	-0.0482**** (0.0065)	-0.042**** (0.006)	0.0059 (0.0089)	0.0129** (0.0045)	-0.0482**** (0.006)	-0.0588**** (0.0085)
Q0.75: Impact	0.0078 (0.0164)	-0.0572**** (0.0088)	-0.0149*** (0.0062)	0.0313**** (0.0067)	0.0362**** (0.0046)	-0.572**** (0.0042)	-0.0437**** (0.0035)
Q0.90: Impact	-0.0101 (0.00174)	-0.0443**** (0.006)	-0.0202** (0.0086)	0.0374**** (0.0039)	0.0326**** (0.0043)	-0.443**** (0.116)	-0.0406**** (0.0045)
Q0.95: Impact	-0.08**** (0.00259)	-0.0231*** (0.006)	-0.1061**** (0.007)	0.0237**** (0.0055)	0.0111**** (0.0034)	-0.0231*** (0.0094)	-0.0402**** (0.0056)
No. Observations	50, 000	16, 578	17, 046	36, 594	40, 107	29, 015	26,889

Notes: All regressions include controls for year-specific dummy variables, recipient characteristics, and area fixed effects. Standard errors in parentheses, adjusted for clustering at the claimant level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Table 15: Impacts of 2018 Student Support policy change on *logrent* **5+ bedroom households** – by city.

Mean/Quartile	Full Sample	City					
		Palmerston North		Wellington		Dunedin	
		Post Announcement	Post Implementation	Post Announcement	Post Implementation	Post Announcement	Post Implementation
(a) Mean Regressions Policy Impact (β3)	-0.0187* (0.0135)	—	0.07**** (0.019)	—	0.034*** (0.014)	—	0.0318*** (0.012)
Mean Regressions Announcement effect (β3)	—	0.0173 (0.022)	—	0.0819**** (0.022)	—	0.11674**** (0.033)	—
Intercept	6.56**** (0.009)	6.24**** (0.017)	6.18**** (0.011)	6.652**** (0.014)	6.705**** (0.010)	6.38**** (0.007)	6.510**** (0.007)
Post	0.042**** (0.013)	0.0214 (0.021)	0.058**** (0.018)	0.003 (0.021)	0.019* (0.0132)	-0.1206 **** (0.033)	-0.031*** (0.0114)
Treatment	0.052**** (0.009)	0.023 (0.018)	-0.03 (0.024)	0.163**** (0.016)	0.216**** (0.012)	0.2187 **** (0.0277)	0.111**** (0.008)
R-squared	0.041	0.033	0.1065	0.0659	0.1336	0.0407	0.0350
F-value	163.5	18.92	41.29	105.8	166.04	140.35	83.90
No. Observations	50,000	47, 167	49, 777	19, 490	13919	42,713	29, 688
(b) Quantile regressions							
Q0.25	0.0392**** (00058)	0.0048 (0.0249)	0.102**** (0.025)	0.0495**** (0.006)	-0.0294* (0.0146)	0.1667**** (0.039)	0.0684** (0.029)
Q0.5: Impact	0.0571**** (0.0144)	0.0541**** (0.0116)	0.0564**** (0.016)	0.0842**** (0.0228)	0.0292*** (0.011)	0.1005*** (0.0327)	0.0374*** (0.0121)
Q0.75: Impact	0.0078 (0.0177)	0.0223 (0.0262)	0.0613*** (0.0212)	0.0703**** (0.0162)	0.0273*** (0.0141)	0.290**** (0.0506)	0.0531**** (0.0115)
Q0.90: Impact	-0.0101 (0.0187)	0.0741*** (0.0235)	0.0834**** (0.013)	0.0705**** (0.008)	0.0069 (0.0153)	0.416**** (0.0486)	0.0753**** (0.012)
Q0.95: Impact	-0.08*** (0.0273)	-0.057*** (0.017)	0.105**** (0.032)	0.032**** (0.009)	-0.017* (0.0100)	0.3717**** (0.045)	0.0470*** (0.0470
No. Observations	50,000	47, 166	49,776	19, 491	13, 917	42,711	29, 688

Notes: All regressions include controls for year-specific dummy variables, recipient characteristics. Standard errors in parentheses, adjusted for clustering at the claimant level.
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.001$.

Table 16: Palmerston North 5+ post Jan 2018

Implied marginal propensities to spend and income elasticities

Mean or Quantile	Student Support Income		Rental Payments		Implied:	
	2018 (1)	Total Change (2)	2018 (3)	Policy Impact (4)	MPS on Rent (5)	Income Elasticity (6)
Mean	286.42	62.33	$592.75	19.34****	0.31	0.15
Q 0.25	133.23	34.76	463.32	50.00****	1.44	0.41
Q 0.50	258.85	48.66	528.89	35.00****	0.72	0.35
Q 0.75	409.20	91.44	646.01	40.00****	0.44	0.28
Q 0.90	523.95	105.02	701.45	70.00****	0.67	0.50
Q 0.95	599.01	124.08	758.37	80.00***	0.64	0.51

Table 17: Dunedin 5+ bedroom households, post announcement 21 January 2018

Implied marginal propensities to spend and income elasticities

Mean or Quantile	Student Support Income		Rental Payments		Implied:	
	2018 (1)	Total Change (2)	2018 (3)	Policy Impact (4)	MPS on Rent (5)	Income Elasticity (6)
Mean	292.52	66.70	$744.22	22.29***	0.33	0.13
Q 0.25	157.98	40.46	634.30	35.00****	0.87	0.22
Q 0.50	285.12	63.13	721.89	27.12****	0.43	0.17
Q 0.75	418.00	96.00	826.84	44.00****	0.46	0.23
Q 0.90	493.60	104.71	928.12	64.00****	0.61	0.33
Q 0.95	539.49	110.91	1016.36	45.00****	0.41	0.22

(6)={(4)/(3)}/{(2)/(1)
(5)=(4)/(2)

Table 18: Wellington 5+ bedroom households, post announcement 21 January 2018

Implied marginal propensities to spend and income elasticities

Mean or Quantile	Student Support Income		Rental Payments		Implied:	
	2018	Total Change	2018	Regression/ Policy Impact	MPS on Rent (5)	Income Elasticity (6)
Mean	291.68	68.74	$1,089.76	30.25***	0.44	0.12
Q 0.25	145.04	70.54	863.03	-5.00	-0.07	-0.01
Q 0.50	284.20	68.62	1041.12	35.00****	0.51	0.14
Q 0.75	414.75	95.85	1189.45	25.00***	0.26	0.09
Q 0.90	509.08	103.51	1332.64	15.00	0.14	0.06
Q 0.95	570.60	113.96	1416.19	-6.00	-0.05	-0/02

Table 14 and Table 15 present regression result of a log-level model where I regress the log of rent (y) on year (x). This log model presents the policy impact in terms of a per-centage change instead of the absolute changes presented in Table 10 and Table 11.
In this model, the per-cent change interpretation is on the variable that has the log (rent) and the absolute change will be on the variable without the log (year) — increasing date by one accompanies a 100*β percent change in y. Results in Table I and 11 are compara-ble to Tables 8 and 9.

Table 14 presents results for 3-4 bedroom households by city and shows a statistically significant (at the 5% level) increase of 1.72% for the full sample. When we look at each city, we can see the main effect of the policy is felt in Wellington, while Palmer-ston North and Dunedin show a statistically significant negative result. Meaning rents in the control group increased more than the treatment. Palmerston North results show an estimate negative impact for the 12-months post announcement of 1.4% (statistically significant at the 5% level) and a small impact -1.6% post implementation (statistically significant at the 10% level. Wellington shows a statistically significant increase (at the 0.01% level) of 1.26% post announcement and 1.9% post implementation.
Dunedin shows a statistically significant negative impact (at the 5% level) of 1.39% post announcement and 4.4% post implementation (at the 0.01% level).

Table 15 presents results for 5+ bedroom households by city. The full sample estimates suggest a small statistically significant at the 10% level increase of 1.8%. When we look at each city, Palmerston North shows a statistically significant increase, (at the10% lev-el) post implementation of 7% and a small statistically insignificant impact following the policies announcement. Wellington shows a statistically significant increase (at the 1% level) of 3.4% for the 12 months following the policy implementation, and a larger statistically significant impact (at the 0.01% level) of 8.19% for the 12 months follow-ing the announcement.

Dunedin shows a statistically significant increase (at the 0.1% level) of 3.18% post im-plementation and 16.67% (at the 0.01% level) post announcement.