



MASSEY UNIVERSITY
COLLEGE OF BUSINESS
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Massey University
Economic and Welfare Contribution of the
Wellington Campus to the Wellington Region

October 2013

Authorship

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EXECUTIVE SUMMARY

This report analyses the economic and welfare contribution of Massey University's Wellington campus to the Wellington region. The primary contribution of this report is the identification of the net benefits Wellington region would miss out on if Massey (Wellington) was not present.

The basis of this analysis stems from previous impact studies on Massey University's Albany campus and extramural program (Schumacher, 2005, 2011). Moreover, the report relies on information contained in annual and financial reports of Massey University, The New Zealand University Students Association (NZUSA), Statistics New Zealand, and several reports produced by commercial and government entities.

Massey (Wellington) has a direct economy impact in three key areas: university expenditure, student expenditure and employment. Furthermore, due to flow-on effects, Massey (Wellington) also has an indirect economic impact. The overall economic impact is determined using a combination of primary data and multiplier analysis.

The Wellington campus has a welfare impact in four main areas: research and technical expertise, physical, human and social capital. This welfare contribution is assessed using internal Massey University information.

The following is a summary of the main results of the analysis.

Impact Analysis of the Wellington Campus

Economic Impact

In 2012, the presence of Massey University (Wellington) contributed a total of \$475 million to the Wellington regional economy and created a total of 832 full-time equivalent jobs. In detail, the economic contribution is as follows:

- The direct expenditure of Massey (Wellington) was \$56.9 million.
- The direct expenditure of students that would not have occurred if the Wellington campus was not present in the region was \$81.9 million.
- After considering the direct, indirect and induced expenditure impacts, Massey University (Wellington) contributed \$204.7 million worth of output to the Wellington regional economy.
- After taking into account the direct, indirect and induced expenditure impacts of the University's students, a further \$270.3 million worth of output was added to the Wellington regional economy.
- In 2012, Massey (Wellington) employed the full-time equivalent of 416 staff.
- For every full-time equivalent position at the University, one additional job is created in the wider economy.
- Massey (Wellington) has a headcount of 4,575 students in 2012, which amounts to 3,182 equivalent full-time students (EFTS).

Welfare Impact

Massey University (Wellington) and its students make a large contribution to the well-being of the wider Wellington community. These contributions encompass the following aspects:

- **Research and technical expertise:** Massey (Wellington) is a centre of research excellence. The research contribution of the University increases the level of knowledge within the region which may result in higher levels of efficiency and living standards in the community.
- **Physical capital:** Massey (Wellington) adds to the infrastructure and physical capital stock of the Wellington region through its stock of non-residential property such as sports amenities, conference facilities and social and cultural buildings.
- **Human capital:** Massey (Wellington) guides and manages human capital by educating students, developing staff and providing a research environment.
- **Social capital:** Massey (Wellington) contributes to the social capital of the Wellington region in the form of community activities carried out by staff members and students.

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1. INTRODUCTION

1.1 Purpose and Structure of the Report

The purpose of this report is to analyse the economic and welfare contribution that Massey University (Wellington) makes to the Wellington region. This report relies on information contained in annual and financial reports of Massey University, The New Zealand University Students Association (NZUSA), Statistics New Zealand, and several reports produced by commercial and government entities.

To assess the impact of the Wellington campus, the expenditure effects of Massey (Wellington) and its students have been quantified, as well as the employment impact associated with the Wellington campus. Universities, however, provide more than just economic contributions to a community. Indeed, universities contribute to the well-being of the wider community by way of the development of social and human capital, knowledge spillovers, and the development of physical capital. Consequently, this report aims to outline the social contribution of Massey (Wellington) to the well-being of the Wellington community¹. Combining both the economic and welfare contributions will give a more complete indication of the net benefits the Wellington City and the wider region would forgo if Massey (Wellington) was not present.

In order to put this analysis in some context, the report begins with a brief overview of Massey University in its entirety, Massey (Wellington), and the competitors of the Wellington campus. Second, the analytical framework is introduced. Third the economic impact of Massey (Wellington) is identified. Last, the university's contribution to social welfare is presented.

1.2 Massey University

With approximately 33,500 students, Massey University is one of New Zealand's largest² universities. Founded in 1927, near Palmerston North, Massey University Agricultural College was named after a former Prime Minister of New Zealand, William Ferguson Massey (1865 - 1925), who dedicated much of his life to the promotion of agriculture.

The College offered degree programmes leading to Bachelor and Master of Agricultural Science degrees, and students could also enrol in a variety of short courses in farm management and technology. Courses in horticulture were added after the war.

From 84 students in its first year, the College's roll grew steadily to 500 in 1960. The following two decades saw a period of rapid change as Massey entered a major new phase in its development.

Granted university status in 1963, Massey grew within two years into a multi-faculty institution comprising Agricultural and Horticultural Sciences, Technology, Veterinary Science, Science, Humanities and Social Sciences. Extramural teaching was also

¹ The scope of the report is limited to the identification of such welfare effects attributable to Massey University (Wellington), rather than any attempt at a detailed quantification.

² Reference is to number of enrolled students.

introduced. In the 1970s the University expanded with further faculties in educational and business studies.

The University's continuing development has since been reflected in the growth of research centres and schools over the last two decades. In 1993, Massey University established a second campus at Albany on the North Shore of Auckland and in 1999 a third campus in Wellington.

1.3 Massey University (Wellington)

Currently, the Wellington campus hosts 4,575 students (3,182 EFTS) and is based in the heart of Wellington City. Often coined the 'Creative Campus', Massey University Wellington is home to New Zealand's oldest and most distinguished school of design, which was established in 1886. In addition to this, the Wellington campus offers study and research in four broad areas including: communication, business, health and well-being, and the creative arts. More recently, however, Massey (Wellington) and Victoria University have jointly given rise to the New Zealand School of Music (NZSM).

1.4 Competitors

Being one of several tertiary institutions located in the Wellington region, Massey (Wellington) has a few key competitors in terms of their communication, business, health and well-being, and creative arts study areas.

Clearly, the biggest competitor to Massey (Wellington) is Victoria University which has a campus situated only 10 minutes away from that of Massey (Wellington). In addition to the close proximity, Victoria University offers commerce and arts programs at all study levels, whilst also graduate communications, nursing, and health programs. As such, direct competition for students exists between both universities.

Another competitor of Massey (Wellington) is a tertiary institute of technology, Whitireia New Zealand. Boasting campuses in Wellington City, Porirua, and other areas of the country, Whitireia New Zealand, offers programs in design, performing arts, business studies, nursing, and health. However, with several of these courses only offered at the largest campus in Porirua, it seems reasonable to suggest that Whitireia presents less competition to Massey (Wellington) relative to that of Victoria University.

Wellington Institute of Technology, commonly known as 'WelTec', presents another competitor to Massey (Wellington). In addition to its campus being located approximately 5 minutes away from the Massey (Wellington) campus, WelTec also offers study programs in areas including business studies, design, and exercise science. However, considering that the majority of these programs offered are diplomas, it is likely that WelTec poses less direct competition with Massey (Wellington) over prospective students aiming to study towards a degree qualification.

2. ANALYTICAL FRAMEWORK

This report has the primary aim of evaluating the economic and welfare contribution of Massey (Wellington) to the Wellington region. The analytical framework,³ as outlined below, follows almost exactly that used by Schumacher (2005, 2011) to determine the net benefits of the Albany campus to the Auckland region. Economic and welfare impact is determined as follows:

Economic impact: Immediate direct and indirect flow-on effects of the spending of Massey (Wellington) and its students, plus direct and indirect impact on employment. The direct effect is the initial impact of Massey (Wellington), whereas the indirect effect measures the impact of the supplier industries associated with the campus.

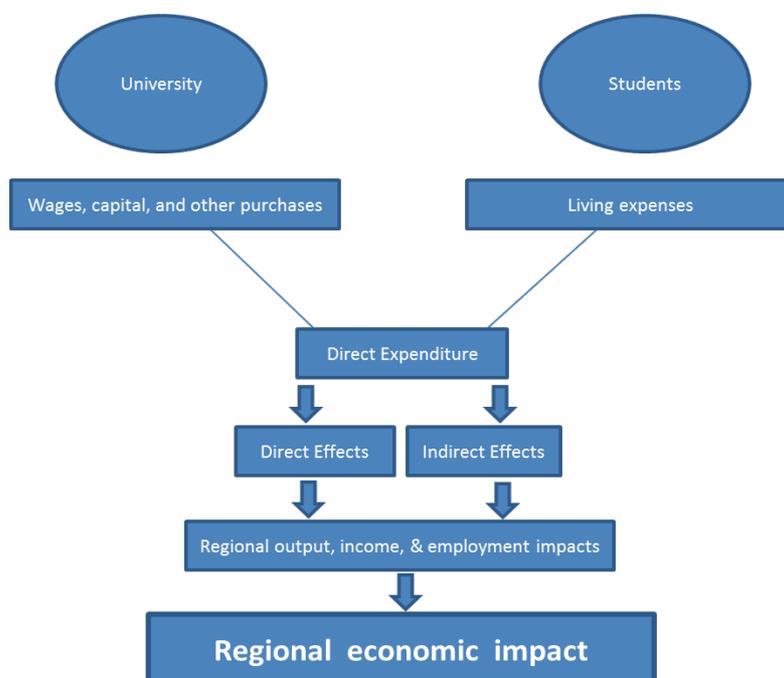
Welfare impact: Effects resulting from the development of social and human capital, knowledge spillovers and physical capital.

This report generates both numerical and qualitative results, as discussed in the following sections.

2.1 Economic Impact Analysis

Figure 1 provides an overview of the economic impact analysis. The direct and indirect effects are outlined in the following sub-sections.

Figure 1: Economic impact analysis:



Source: NZIER

³ The New Zealand Institute of Economic Research (NZIER) has used this methodology in previous economic impact studies for The University of Auckland and The University of Canterbury.

2.1.1 Direct impacts

Massey University (Wellington). Current expenditure by Massey (Wellington) resulting from daily business activities such as salaries and operating expenses flows directly into the Wellington economy and the wider economic region. Furthermore, additional expenditure such as construction costs and other purchases as well as capital expenditure need to be considered. All information relating to expenditure is taken from Massey's statement of financial performance and Annual Report (Massey University, 2012) and from internal Massey University records..

Students. Spending by Massey (Wellington) students on items such as accommodation, transport, food or entertainment.

Employment. Staff numbers in full-time equivalent (FTE) positions. Expenditure by staff will *not* be considered to avoid 'double-counting'⁴.

2.1.2 Indirect expenditure (multiplier) analysis

Every time a dollar is spent by Massey (Wellington) or one of its students in the Wellington region, successive rounds of economic activity and spending begin. For example, Massey (Wellington) requires inputs of books, energy, information technology, communication services etc. to deliver education to students and conduct research. However, when Massey (Wellington) purchases an item, a portion of that expense will be used by the supplier to pay wages and operating expenses. These wages and expenses will in turn be spent by employees of the supplier on other goods and services, and impact on the output on other firms and so on. Therefore, the total economic contribution of one dollar of expenditure is greater than the one dollar initially spent. A multiplier measures the magnitude of these flow-on effects. We will use different multipliers to determine the effects on output and employment associated with Massey (Wellington).

2.2 Welfare Contribution

In addition to the economic impact, there are many ways by which Massey (Wellington) positively contributes to the well-being of the wider Wellington community. Despite being difficult to quantify in monetary terms, these benefits have the potential to contribute to the growth of the region by adding to the knowledge base in the society. Four main areas of social welfare can be determined⁵. First, research and technical expertise which refers to the knowledge and expertise available within a community. Second, physical capital which describes the infrastructure of the community. Third, human capital, which is an individual's ability to perform a specific task. Fourth, social capital, which represents the collection of intangible resources available in a community such as social networks, community life and spirit, social bonds, friendships and civil virtue. This analysis will examine how Massey (Wellington) contributes to each of these categories.

⁴ Salaries and wages are already included in university expenditure.

⁵ The four categories are based on findings by previous NZIER studies for The University of Auckland and The University of Canterbury.

3. ECONOMIC IMPACT ANALYSIS – DIRECT EXPENDITURE AND EMPLOYMENT RESULTS

This section analyses the direct economic impact of Massey (Wellington) and its students on Wellington city and the wider region.

3.1 University Expenditure

According to accounting records, \$56.9 million in spending could be directly attributed to the Wellington campus in 2012. This is composed of \$31.4 million for staff salaries and wages, \$8.4 million in operating costs, \$2.8 million in asset related costs, and \$14.2 million in capital expenditure for 2012. A comparison with past data shows that Massey Wellington's expenditure on staff salaries, operating expenditure, and asset-related expenditure has been relatively stable over the past 5 years. Furthermore, the capital expenditure of Massey (Wellington) has been slightly higher in 2012 and 2011, compared with 2010, due to the purchase of buildings in the Wellington region.

Expenditure for both Massey (Wellington) and all of Massey University have been included in table 1 below. This gives an indication of the proportion of total expenditure across the entire university which is attributable to the Wellington campus. In all cases depreciation has been excluded with capital spending included instead.

Table 1: Expenditure overview

Dollar millions, 2012 prices

Year ended December 2012

Expenditure category	Massey (all)	Wellington Campus
People costs	234.5	31.4
Operating costs	103.8	8.4
Asset related costs	27.7	2.8
Capital expenditure	52.9	14.2
Total	419.0	56.9

Table 2 presents a more detailed breakdown of Massey Wellington's capital expenditure.

Table 2: Capital Expenditure Breakdown

Dollar millions, 2012 prices

Year ended December 2012

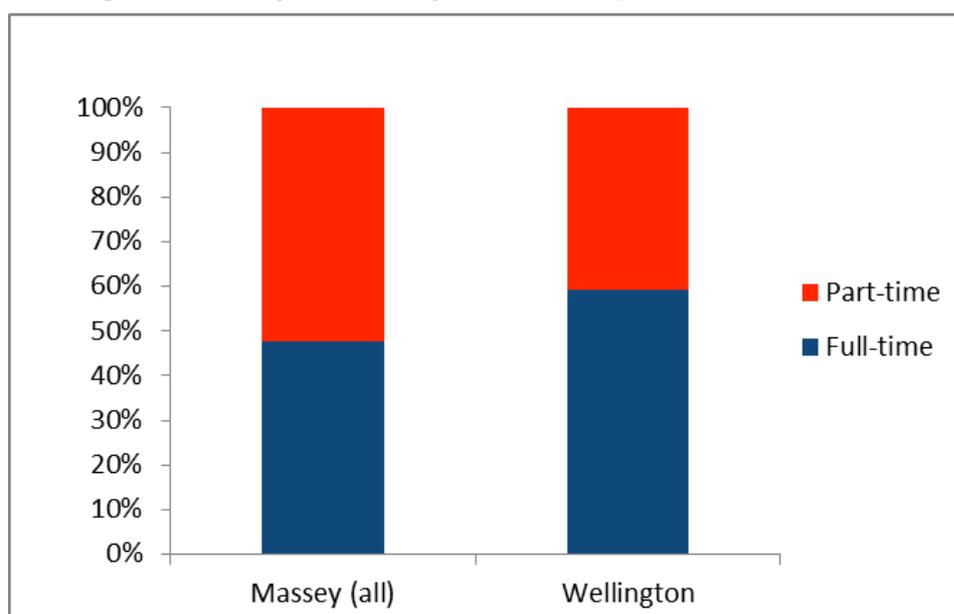
Expenditure category	Wellington Campus
Infrastructure	0.3
Capital	8.4
Minor Capital	0.4
IT Software	0.8
Library Books	1.0
Equipment	3.2
Total	14.2

3.2 Demographics of Students

Understanding the impact of student expenditure requires knowledge of the demographics of Massey University students. The Massey University Annual Report sets out a profile of Massey University students. As such, this report provides a brief set of descriptive statistics regarding the demographics of students enrolled at Massey (Wellington). In order to provide some perspective, descriptive statistics for Massey university in its entirety are also presented.

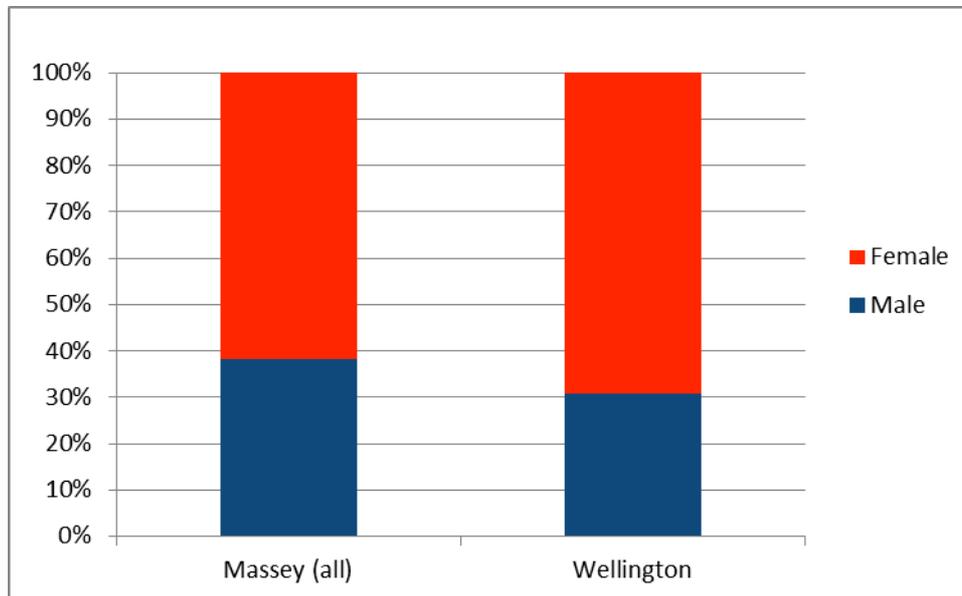
In the 2012 calendar year there were a total of 4,575 students or 3,182 EFTS enrolled at the Wellington campus. By comparison, Massey University as a whole had a total of 33,491 students and 19,704 EFTS in 2012. Of the 4,575 students enrolled at Massey (Wellington), 59% are full-time students, whilst the remaining 41% are listed as part-time. Relative to Massey University in its entirety, Massey Wellington has a noticeably larger percentage of full-time students.

Figure 2: Massey students by full time and part time status:



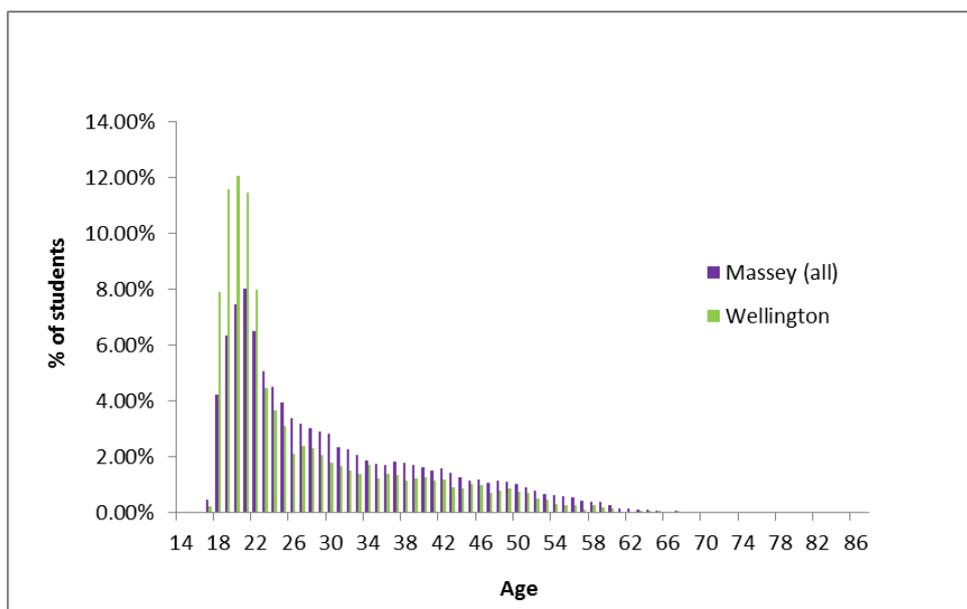
Moreover, Figure 3 below shows a breakdown of students by gender. As is shown, Massey (Wellington) has a lower percentage of male students (31%), compared with the percentage of male students (38%) across the entire university.

Figure 3: Massey students by gender:



Despite a few noticeable points of difference, the age composition of students at Massey University (Wellington) and the entire university follows a similar distribution as shown in Figure 4.

Figure 4: Percentage of Massey students by age:



The strong positive skew for both groups, indicates that the majority of students are in their late teens and early twenties. Whilst this is unsurprising, it is important to note that Massey (Wellington) has a much larger percentage of students aged between 18-22

relative to all of Massey University. Furthermore, the raised purple tips on the righthand portion of the graph indicate that Massey (Wellington) has a smaller percentage of older students compared with the entire university.

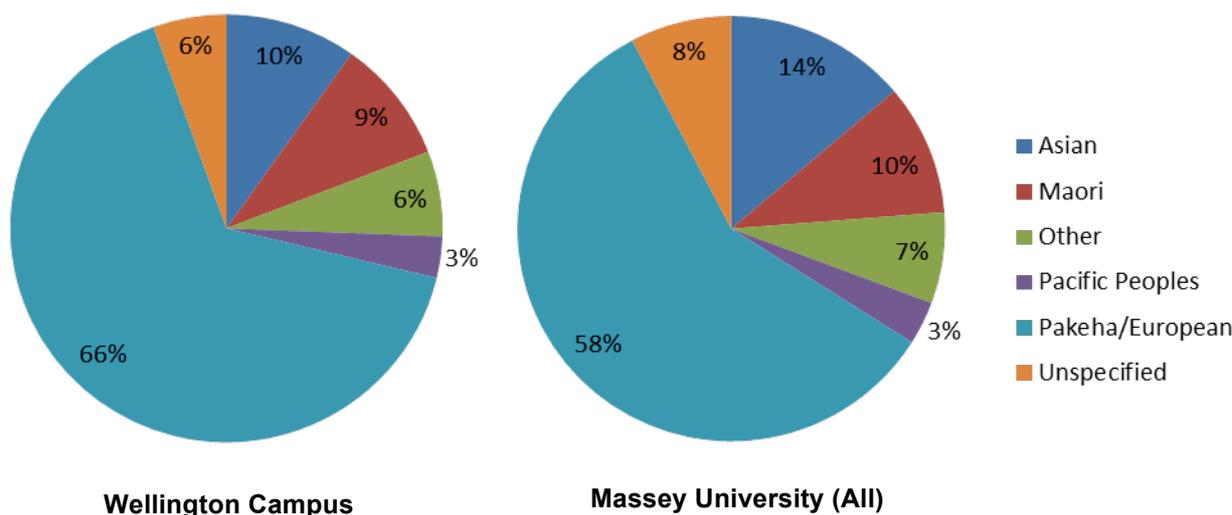
An analysis of the median age of students shown in Table 3 shows a median age of students at the Wellington campus of 22 years whereas students across all Massey University have a median age of 27 years. The long tail of the distribution shows up in a comparison of the upper quartile of 32 for Wellington students against 37 for all Massey University students.

Table 3: Analysis of students by age

	Massey (all)	Wellington
Lower quartile	21	20
Median age	27	22
Upper quartile	37	32

An analysis of ethnicity has also been provided to allow for a comparison between students studying at the Wellington campus and students studying at all Massey University. Although both groups have a similar percentage of Pacific students (3%) and Maori students (9% and 10%), it is evident that the Wellington campus hosts a higher percentage of Pakeha/European students (66%), whilst a lower percentage of Asian students (10%) relative to Massey University as a whole.

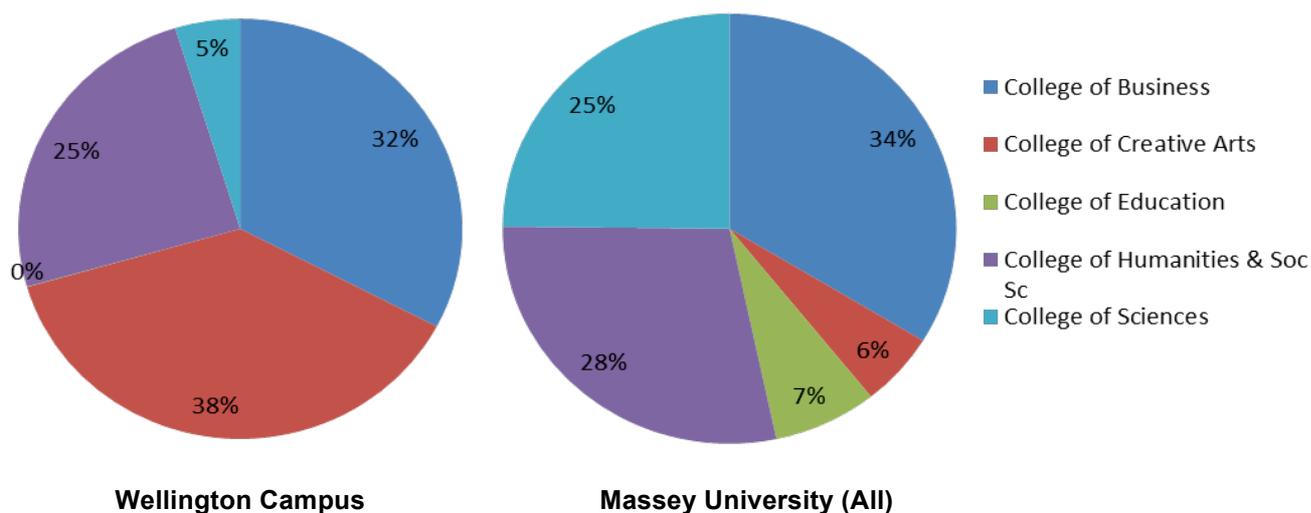
Figure 5: Ethnicity of Massey University Students



There are also differences between the two student populations in terms of the courses in which they enrol and faculties in which they study (see figure 6 below). The most noticeable difference is that 38% of the students enrolled at the Wellington campus are part of the College of Creative Arts compared with only 6% throughout all of Massey University. Conversely, only 5% of Massey (Wellington) students are part of the College of Science compared to 25% for the entire university. In addition to this, about 7% of students across all of Massey University are part of the College of Education,

whilst virtually no students at Massey Wellington are part of this college. In terms of similarities between both populations, about one third of students enrol in Business Studies or related courses, whilst approximately one quarter of students are part of the College of Humanities and Social Sciences. These figures reflect the way in which Massey Wellington’s strength lie in their creative arts, business, and humanities and social sciences programs.

Figure 5: Massey University students by faculty:



3.3 Student Expenditure

The New Zealand Universities’ Students’ Association (NZUSA) has periodic surveys of student income and expenditure that is carried out every 3 years. The NZUSA has provided a copy of the results from the 2010 survey collected and collated by Colmar Brunton which is divided into weekly expenses and annual expenses. Since this is the most recent survey available, the 2010 prices have been adjusted to 2012 prices. Moreover, the NZUSA survey provided data on mean Auckland expenditure by students. However, using the cost of living calculator on the government’s study link website (Ministry of Social Development, 2012), it has been estimated that there is a 3.37% premium associated with living in Auckland compared with Wellington. As such, the mean Wellington expenditure by students has been estimated by deflating the mean Auckland expenditure figures by this amount.

Table 4 shows the weekly expenses for Wellington based students and the New Zealand average.

Table 4: Surveyed living expenses

Dollars per year, 2012

Typical, regular expense weekly

Expenditure Group	Mean Wellington expenditure	All NZ expenditure
All food ¹	67.4	66.8
Local Transport ²	41.6	37.1
Accommodation	158.3	144.3
Entertainment	41.0	36.1
Living Expenses ³	39.4	37.1
Personal Items ⁴	22.7	19.1
General bills ⁵	31.6	29.7
Miscellaneous	67.5	34.0
Childcare costs	73.6	65.8
Total	543.1	470.1

Notes: 1 Includes groceries, lunches, takeaways, and snacks

2 Includes cost of petrol, buses, trains, and taxis

3 Includes power and phone bills, appliance rental, other bills

4 Includes cosmetics, razors, magazines, etc

5 Includes insurance bills, maintenance, etc

Source: NZUSA (2010)

By multiplying these weekly expenses by the forty weeks of the student year and then adding on the surveys annual expenses we can estimate total annual expenditure for Wellington students as shown in Table 5 below.

Table 5 Annual living expensesDollars per year,
2012

Expenditure Group	Typical, regular expense annual		Other, irregular or one-off annual expenses	
	Mean Wellington expenditure	All NZ expenditure	Expenditure Group	Mean expenditure
All food	2,697.50	2,673.91	Textbooks & course costs	535.84
Local Transport	1,662.84	1,485.51	Clothes	433.98
Accommodation	6,331.13	5,772.25	Travel out of town	698.19
Entertainment	1,638.21	1,443.06	Music & books	170.83
Living Expenses	1,576.62	1,485.51	Medical, dental, & optical costs	408.51
Personal Items	907.38	763.97	Computer, stereo, & appliances	1,133.23
General bills	1,264.58	1,188.40	Other non-vehicle items	579.35
Miscellaneous	2,701.61	1,358.18	Purchase of cars & bikes	3,145.03
Childcare costs	2,943.85	2,631.47	Other major expenses	2,011.80
Subtotal	21,723.73	18,802.26	Subtotal	9,116.76
Irregular expenses	9,116.76	9,116.76		
Total	30,840.49	27,919.02		

Source: NZUSA
(2010)

Note that tuition fees have not been included to avoid the expenditure being double counted (tuition fees are likely to be used by the university to cover its expenditure).

Knowing what level of expenditure a student must make each year to study we next turn to calculating the direct impact of students.

3.4 Direct Expenditure by Students

The analysis determines the impact of the Massey Wellington campus on the Wellington economy. One may think of this as the loss that would occur to the Wellington economy, if Massey (Wellington) did not exist.

However, it is clear that some of the identified student expenditure would occur even if Massey (Wellington) was not in existence. The reason for this is that some students would move into employment or study elsewhere in the region (i.e. at Victoria University or the other competitors previously mentioned.) As such, the annual expenditure of these students that would remain in the Wellington region, regardless of the existence of Massey (Wellington), should not be considered in our analysis.

To determine the net impact of student expenditure, we only consider students that have

- (i) come from outside the region to study at Massey (Wellington) or

- (ii) remained in the region for studies at Massey (Wellington) but would otherwise have left.

Another issue related to how part-time students should be incorporated into an economic analysis. Standard practice for many studies of this nature is to include part time students without differentiating them from full time students. The basis for this approach rests on the argument that some part time students cannot afford to study full time and may have lower expenditure while other part time students may be working in high paid jobs and actually have higher levels of expenditure. Because these two groups may cancel-out one another, many national and international impact studies of universities assume that part-time students have similar spending patterns as full-time students.

Where part time students are not a significant part of the university roll, that approach may not lead to any noticeable problems in the analysis. However where part time students make up a significant element of the student roll and even a majority of students then these assumptions need to be examined in more detail. For this study the analysis of student impacts has been calculated for three different scenarios as follows:

- Part time students are treated as equal to full time students;
- Part time students are ignored and only full time students assessed;
- Equivalent full time students are used for the analysis.

Each of these approaches has both advantages and disadvantages. Adding both part time students and full time students together is consistent with many studies carried out for other national and international universities. However the spending by part time students may have occurred whether or not the university course was available to them. This approach must lead to an upper bound on potential direct impacts.

Ignoring part time students entirely ensures that direct impacts of student spending are not over-stated and leads to a lower bound analysis.

Using an EFTS method allows the impacts of part time students to be included in proportion to their workload as students. However an objection to this method is that a student who takes only one university paper in addition to working full time gets included proportionately in student spending when perhaps all of their spending would have occurred in any case whether or not they were studying.

Table 6 below presents the results of each of these methods of assessing direct student expenditure.

**Table 6: Annual expenditure by Massey (Wellington) students
(using three methods)**

1/ Total Students

Expenditure per student	30,840.49
Full + part time students	4,575
	\$141,095,239

2/ Full time students

Expenditure per student	30,840.49
Full time students	2,715
	\$83,731,928

3/ Equivalent full time students

Expenditure per student	30,840.49
Equivalent full time students ¹	3,182
	\$98,134,437

Notes: 1 Includes extramural students

Of these methods the EFTS analysis falls between the upper and lower bounds provided by the other two methods. The EFTS method is used for the rest of this study.

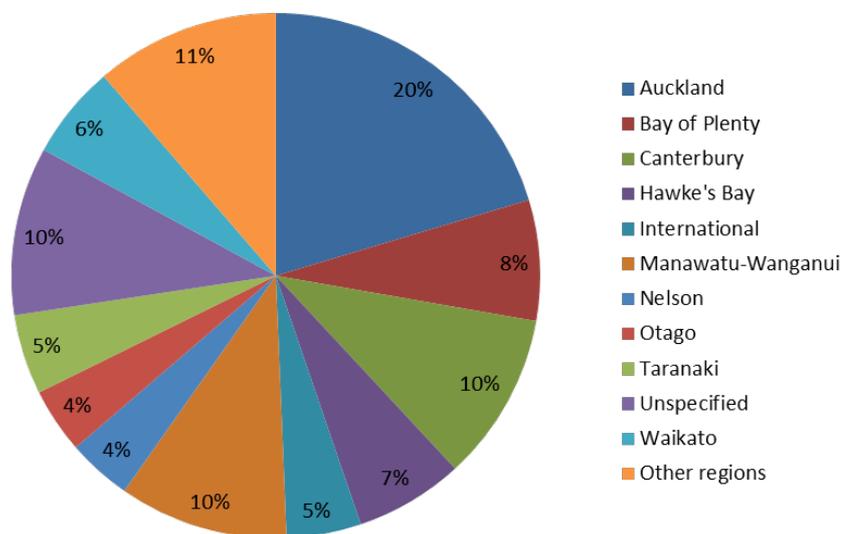
Massey University internal records show that 67% of Wellington students came from outside of the Wellington region to study at Massey Wellington in 2012. As illustrated in table 7 below, the percentage of Massey (Wellington) students from outside of Wellington has been increasing slightly over the past 3 years.

Table 7: Origin of Massey (Wellington) students

Origin	2010	2011	2012
Wellington	37%	35%	33%
Outside Wellington	63%	65%	67%

Figure 7 shows where the non-Wellington students originated from before coming to study at Massey (Wellington).

Figure 7: Origin of non-Wellington Massey (Wellington) Students



Massey University (Wellington)

In order to determine the value of attracted students to the region, we multiply the percentage of students that came from outside Wellington, by the previously determined expenditure figure of \$98.1 million. The result of \$65.8 million is the annual expenditure by students who have moved from outside of the region to study at Massey (Wellington).

To determine the number of students that would have left the Wellington region if Massey (Wellington) did not exist is more difficult. No specific data exist. The University of Auckland (NZIER, 2002, 2006) has assumed that the retention effect accounts for half of its full-time students from the region while The University of Canterbury (NZIER, 2003) uses a figure of 60%⁶. Given the Wellington region is similar to the Auckland region, in that they both have several tertiary institutions, we use the more conservative Auckland estimate.

Of the 33% of total students that are from the Wellington region, we estimate that 50% remain in the City as a result of the presence of Massey University (Wellington). We now multiply the net retention rate of 16.5% by the previously determined expenditure figure of \$98.1 million. The result suggests that \$16.2 million in annual expenditure can be attributed to students who have remained in the Wellington region to study at Massey (Wellington).

Combining this with our previous expenditure figures, our analysis indicates that the annual expenditure by students that the Wellington region would miss out on if Massey (Wellington) was not present is approximately \$82 million (= \$65.8 million + \$16.2 million). See table 8 below.

⁶ The study justifies the higher retention rate by the lower range of options available in the Canterbury region.

Table 8: Impact of student spending

Annual Student Expenditure (EFTS)	\$98,134,437
Students who came from outside the region	
Proportion	67%
Value attracted students	\$65,750,073
Students who would have moved away	
All students proportion	50%
Proportion of students from Wellington	33%
Value of retained students	\$16,162,688
Student expenditure due to Massey Wellington	\$81,912,761

3.5 Total Direct Expenditure by the University and its Students

The total direct expenditure can now be determined adding up direct expenditure by a) the university, b) students that have come to the Wellington region to study at Massey (Wellington) and c) students that were retained in the Wellington region.

As illustrated by table 9, the total direct expenditure attributable to Massey (Wellington) and its students in 2012 comes to \$138.8 million.

Table 9: Total direct expenditure

Dollar millions, 2012 prices

Expenditure category	Wellington Campus
University	56.9
Attracted students	65.8
Retained students	16.2
Total	138.8

Although a large portion of the Wellington campus spending will occur in the Wellington region, some percentage may be spent outside the region. However, no accepted estimate of this proportion exists. Furthermore, some proportion of income will not directly contribute to economic activity in the local region as it will be used to pay taxes and for savings. However, these 'leakages' are at least partly offset by injections into the regional economy from government spending. For simplicity in this

analysis we assume that the leakages and injections are equal – there is a zero net impact.

3.6 Direct Employment Impact of Massey (Wellington)

Massey University (All) currently employs about 2972 full-time equivalent (FTE) staff, of which 416 are associated with the Wellington campus. Over the last three years, Massey (Wellington) has experienced a 17% decrease in the number of permanent FTE staff, whilst a 21 % increase in non-permanent FTE staff. Ultimately, the total number of FTE staff at the Wellington campus has decreased by approximately 9% over the past 3 years. The breakdown of FTE staff for the entire university and Massey (Wellington) is presented in table 10 below.

Table 10: Massey University Staff Composition¹

Year ended December 2012		
Staff (FTEs)	Massey (all)	Wellington Campus
Academic	982.86	159.83
General	1,056.80	111.49
Technical	170.85	21.14
Contract & Trading	438.03	80.52
Casual Academic	148.14	20.49
Casual General	148.50	19.16
Casual Technical	26.38	3.65
Total	2971.6	416.3

Notes 1 Excludes NZ school of music staff.

4. ECONOMIC IMPACT ANALYSIS – MULTIPLIER ANALYSIS

4.1 Background

Having calculated the direct effects of Massey (Wellington) and its students, we can move on to estimating indirect and flow on effects caused by the direct expenditure.

Indirect effects occur because in order for one sector of the economy to grow all of the sectors that input into that area also need to grow. In the same way that increasing bread production first requires an increase in wheat, the university can only operate if the industries that provide inputs to tertiary education also exist to support it. Of course once money is spent by the university or its students into these industries then they will in turn be able to pay staff who will then be able to spend the money in other related areas. These additional rounds of spending are known as induced effects.

The following multiplier analysis will measure these effects where we define:

- The *direct effect* is the initial increase in expenditure.

- *Indirect effects* are the first round of purchases by the supplier industries, i.e. those receiving the initial expenditure.
- *Induced effects* include the second and subsequent rounds of output increases in supplier industries and consumption increases by households whose incomes are enhanced by the initial and subsequent rounds of purchases.

The magnitude of these effects will depend on the size of the initial direct expenditure and the location of the suppliers and other affected industries. Two types of multipliers can be used for economic impact studies:

- *Type I multipliers* measure the direct and indirect effects of a change.
- *Type II multipliers* measure the direct and indirect effects, as well as the induced effect of a change.

The focus of this study is on the flow-on effects of Massey (Wellington) and its students. To fully capture these effects we will use type II multipliers for output and employment⁷. The output multiplier measures the change in regional output resulting from a \$1 increase in demand for the Massey (Wellington) output. The employment multiplier captures the change in regional employment resulting from hiring one additional employee by Massey (Wellington).

Error! Reference source not found.¹¹ presents the relevant multipliers for the Massey (Wellington).⁸

Table 11: Multipliers for Massey (Wellington)

	Output multiplier	Employment multiplier
Type I	1.4	1.2
Type II	3.6	2

Source: Statistics New Zealand, NZIER

Note that economic multipliers must be interpreted with caution. Multiplier analysis assumes that a) sectors combine inputs and outputs in fixed proportions, b) no induced changes in relative prices occur and c) labour and capital are available in unlimited quantities. These strong assumptions may at times be violated which would result in an overestimation of the flow-on effects.

4.2 Massey (Wellington) Expenditure Contribution

The total direct expenditure of Massey (Wellington) in 2012 was \$56.9 million. To determine the flow-on effects of this expenditure on the Wellington regional economy, we multiply the Type II regional output multiplier for the Post-School Education sector

⁷ For a description of the methodology used to calculate the multipliers, see Appendix B.

⁸ These multipliers are taken from a previous study by NZIER (2002) for The University of Auckland and were calculated for the Post-Secondary school industry of the input-output tables from Statistics New Zealand. Massey (Wellington) and The University of Auckland operate in the similar economic environments. Thus it is reasonable to assume that the flow-on effects have the same magnitude.

(3.6) with this figure. The result is that Massey University (Wellington) has an overall expenditure impact of \$204.7 million on the Wellington region. In other words, the \$56.9 million in expenditure by Massey (Wellington) leads to an additional expenditure in supply industries of \$147.8 million.

As previously calculated, students at Massey (Wellington) spend an additional \$81.9 million in the regional economy. To calculate the flow-on effects, it is necessary to determine which industries benefit from the student expenditure. As students are likely to spend across a variety of sectors, it is necessary to work out a weighted sectorial multiplier. This sectorial multiplier is based on the expenditure categories established by the NZUSA. Each category is then aligned as closely as possible with the sectors in the 126 industry input-output table. Every industry sector has a specific output multiplier. By weighting these multipliers by each expenditure category's share of total student expenditure, we calculated a weighted average multiplier of 3.3. By applying this multiplier to the initial student expenditure figure of \$81.9 million, the overall expenditure impact of Massey (Wellington) students in the Wellington regional economy comes to \$270.3 million. Consequently, this means the flow-on effects are \$188.4 million (= \$270.3 million- \$81.9 million).

From these figures, the overall contribution of Massey (Wellington) can be derived. When the direct, indirect and induced effects of the expenditure of the University and its students are considered, Massey (Wellington) contributes approximately \$475 million to the Wellington regional economy. These results are summarised in Table 12.

Table 12: Total economic impact Massey (Wellington)

Figures in NZ\$ million

Wellington Campus	Direct Impact	Flow-on Effects	Total
University Expenditure	56.9	147.8	204.7
Student Expenditure	81.9	188.4	270.3
Total	138.8	336.2	475.0

5. WELFARE ANALYSIS

5.1 Overview

As outlined in section 2.2, Massey University also contributes to the well-being of the wider community. Four categories of social impact have been identified, namely research and technical expertise, physical, human and social capital. This section investigates how the university contributes to each category.

5.2 Research and Technical Expertise

Massey University is a centre of research excellence. All academic staff are required to undertake research. Research projects often include other researchers, organisations, businesses and community groups. These research activities may create knowledge spill over effects as, at times, individuals and firms benefit from knowledge of others without compensation. The University furthermore provides technical expertise to businesses and the community. For example, Massey (Wellington) has a research centre called New Zealand Centre for Small and Medium Enterprise Research whereby many businesses in the local community are likely to benefit. The research contribution of Massey (Wellington) increases the level of knowledge within the region which may result in higher levels of efficiency and living standards in the community.

The intellectual output of Massey (Wellington) includes

- books
- chapters in books
- refereed papers and articles
- other pieces of work and reports
- pieces of creative work
- reviews and comments
- completed theses by Masters and Doctoral students

5.3 Physical Capital

Massey (Wellington) adds to the infrastructure and physical capital stock of the Wellington region through its stock of non-residential property such as

- Sports amenities
- Conference facilities
- Social and cultural buildings.
- Bookshops, cafés and cafeteria

Although these facilities are mainly used by students, they are usually open to the wider community.

5.4 Human Capital

Massey (Wellington) guides and manages human capital by educating students, developing staff and providing a research environment. A highly skilled human capital base is likely to have a positive impact on productivity which will lead to more income for workers and employees. Thus, the contribution of Massey (Wellington) to the human capital base benefits both the individual and the regional and national economies as a whole.

Note that is very difficult to quantify the impact on human capital. The impact level depends on the long-term employment locations of Massey graduates. If a significant number of graduates leave the region, then the impact will be reduced in that region.

5.5 Social Capital

Massey (Wellington) contributes to the social capital of the Wellington region in the form of community activities carried out by staff members and students. Furthermore the cultural diversity of Massey (Wellington) students and staff will create other distinctive mixes of activity. For example, entertainment and restaurant options available to everybody in the Wellington area respond to the variety of cultures present at the University.

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APPENDIX A: MULTIPLIER METHODOLOGY

A.1 Derivation of Type I multipliers

Given an n -sector economy, the transactions matrix and the vectors of final demands and outputs can be represented as:

$$Z = \begin{pmatrix} z_{11} & z_{12} & L & z_{1n} & z_{1c} \\ z_{21} & z_{22} & L & z_{2n} & z_{2c} \\ M & M & & M & M \\ z_{n1} & z_{n2} & L & z_{nn} & z_{nc} \\ z_{c1} & z_{c2} & L & z_{cn} & \end{pmatrix} \quad f = \begin{pmatrix} f_1 \\ f_2 \\ M \\ f_n \end{pmatrix} \quad x = \begin{pmatrix} x_1 \\ x_2 \\ M \\ x_n \end{pmatrix}$$

where:

z_{ij} = sector i sales to sector j

f_j = sector j sales to final demand

x_j = total sector j sales

The c -th row represents compensation of employees (ie. payments for labour), and the c -th column is household consumption.

The relationship between the elements of these matrices is:

$$x_i = z_{i1} + z_{i2} + \dots + z_{in} + f_i \quad (1)$$

The technical coefficients (or direct input coefficients) of sector j are written:

$$a_{ij} = z_{ij} / x_j \quad (2)$$

which in matrix form is:

$$A = \begin{pmatrix} a_{11} & a_{12} & L & a_{1n} \\ a_{21} & a_{22} & L & a_{2n} \\ M & M & & M \\ a_{n1} & a_{n2} & L & a_{nn} \end{pmatrix}$$

Thus a_{ij} is the proportion of sector j 's total output (the value of which is equivalent to the value of sector j 's total input) and is made up of inputs from other sectors (i).

Given equation (1), sector i 's sales can be rewritten and expressed in terms of technical coefficients as:

$$x_i = a_{i1}x_1 + a_{i2}x_2 + \dots + a_{in}x_n + f_i \quad (3)$$

Equations (1) and (3) respectively can be written in matrix form as:

$$\mathbf{x} = \mathbf{Z}\mathbf{i} + \mathbf{f} \quad (4)$$

$$\mathbf{x} = \mathbf{A}\mathbf{x} + \mathbf{f} \quad (5)$$

where \mathbf{i} is an n -element column vector of 1s.

Recall that equations (1) and (3) are equivalent.

Using an $n \times n$ identity matrix and rearranging equation (5) yields:

$$\begin{aligned} \mathbf{I}\mathbf{x} - \mathbf{A}\mathbf{x} &= \mathbf{f} \\ \Rightarrow (\mathbf{I} - \mathbf{A})\mathbf{x} &= \mathbf{f} \end{aligned} \quad (6)$$

From this we can derive the change in output, \mathbf{x}^* , arising from a change in final demand, \mathbf{f}^* :

$$\mathbf{x}^* = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f}^* \quad (7)$$

$(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief Inverse, or the total (initial, direct and indirect) requirements matrix. This can be represented by \mathbf{B} so that:

$$\mathbf{x}^* = \mathbf{B}\mathbf{f}^* \quad (8)$$

A.1.1 Output multipliers

Re-expressing equation (8) in expanded format gives:

$$\mathbf{x}^* = \begin{pmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \dots & \dots & \dots & \dots \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{pmatrix} \begin{pmatrix} f_1^* \\ f_2^* \\ \dots \\ f_n^* \end{pmatrix}$$

From this it can be seen that the economy-wide impact of f_j^* is:

$$\mathbf{x}^* = \sum_{i=1}^n b_{ij} f_j^* \quad (9)$$

For $f_j^* = 1$, \mathbf{x}^* reduces to:

$$\mathbf{x}^* = \sum_{i=1}^n b_{ij} \quad (10)$$

\mathbf{x}^* is the (Type I) *output multiplier*: that is, how much does economy-wide output have to increase to meet a \$1 increase in final demand for the output of sector j .

A.1.2 Employment multipliers

These are calculated as for the income multipliers, but rather than use compensation of employees to scale the output effects we have used the ratio of full-time equivalent (FTE) jobs to output by sector. This employment ratio is:

$$e_j = FTE_j / x_j \quad (11)$$

Using this in our multiplier calculation gives:

$$E_j = \sum_{i=1}^n e_i b_{ij} / e_j \quad (12)$$

A.2 Derivation of Type II multipliers

In the calculations above, the matrix elements are restricted to those within the $n \times n$ confines of the transactions matrix of the 1996 Inter-industry tables. However, this effectively excludes the impact of changes in household income arising from additional final demand, since household income and consumption is outside of the $n \times n$ matrix. Type II multipliers address this issue by expanding the $n \times n$ matrix to include household consumption and compensation of employees. Households are effectively treated as another production sector in Type II multiplier analysis, producing labour services and demanding consumption goods and services.

The technical coefficients for the household row and column are:

$$a_{cj} = z_{cj} / x_j \quad (13)$$

$$a_{ic} = z_{ic} / x_c \quad (14)$$

where:

a_{cj} = the labour coefficient for sector j

a_{ic} = the 'household consumption' coefficient.

In equation (14), x_c represents household disposable income. For the analysis contained in this report we calculated household disposable income as the sum of:

- compensation of employees (from the input-output tables)
- self-employed earnings (derived from SNZ's *Institutional Sector Accounts*)
- dividend earnings (derived from SNZ's *Institutional Sector Accounts*)

and then subtracted tax from that sum using an average personal income tax rate derived from the *Institutional Sector Accounts*.

APPENDIX B: LIST OF REGIONAL MULTIPLIERS

Sector	Output_I	Output_II	Employ_I	Employ_II
Other horticulture	1.56	2.84	1.21	1.50
Apple and pear growing	1.77	3.48	1.27	1.62
Kiwifruit growing	1.73	3.01	1.75	2.48
Other fruit growing	1.68	2.96	1.21	1.43
Mixed livestock and cropping	1.83	2.94	1.68	2.20
Sheep and beef cattle farming	1.91	2.99	1.64	2.02
Dairy cattle farming	1.65	2.83	1.54	2.10
Other farming	1.71	2.80	1.30	1.57
Services to agriculture, hunting and trapping	1.74	3.21	1.51	2.03
Forestry	1.79	3.05	5.24	8.66
Services to forestry	1.52	3.27	1.35	2.01
Logging	1.49	3.08	1.31	1.86
Fishing	1.55	2.44	1.71	2.45
Coal mining	1.80	3.14	2.27	4.14
Services to mining	1.40	3.42	1.28	2.14
Other mining and quarrying	1.72	2.97	2.06	3.41
Oil & gas extraction	1.56	2.61	6.31	14.42
Oil & gas exploration	2.01	2.83	5.35	8.16
Meat processing	2.31	3.66	4.27	5.79
Poultry processing	1.69	2.81	2.47	3.83
Bacon, ham and small good manufacturing	1.89	3.12	2.02	2.88
Dairy product manufacturing	1.63	2.29	4.48	6.52
Fruit and vegetable, oil and fat, cereal manufacturing	1.94	3.10	2.75	4.09
Bakery, sugar and confectionery manufacturing	1.87	3.06	2.08	3.13
Seafood processing	1.90	3.04	2.95	4.61
Other food manufacturing	1.61	2.66	1.87	2.89
Soft drink, cordial and syrup manufacturing	1.53	2.51	3.01	5.33
Beer, wine, spirit and tobacco manufacturing	1.76	2.86	3.29	5.32
Textile manufacturing	1.64	2.79	1.64	2.35
Clothing manufacture	1.43	2.70	1.24	1.64
Footwear manufacture	1.41	2.72	1.31	1.93
Other leather product manufacturing	1.56	2.49	1.61	2.25
Log sawmilling and timber dressing	2.08	3.46	2.13	3.30
Other wood product manufacturing	1.66	2.81	1.61	2.36
Paper & paper product manufacturing	1.68	2.84	2.33	4.24
Printing and services to printing	1.58	2.88	1.43	2.17
Publishing, recorded media manufacturing	1.56	2.98	1.51	2.44
Petroleum refining	1.30	1.54	2.76	4.93
Petroleum and coal product manufacturing	1.72	2.75	1.70	2.37
Fertiliser manufacturing	1.85	2.64	3.87	6.33
Other industrial chemical manufacturing	1.66	2.61	2.40	3.97
Medicinal, detergent and cosmetic manufacturing	1.65	2.76	2.08	3.37
Other chemical product manufacturing	1.64	2.69	2.18	3.63
Rubber manufacturing	1.40	2.58	1.54	2.56
Plastic product manufacturing	1.41	2.46	1.48	2.40
Glass and glass product and ceramic manufacturing	1.48	2.70	1.41	2.13
Other non-metallic mineral product manufacturing	1.71	3.01	2.22	3.87
Basic metal manufacturing	1.59	2.60	1.97	3.26
Structural, sheet and fabricated metal product manufacturing	1.80	3.20	1.71	2.60
Motor vehicle and part manufacturing	1.75	2.71	2.36	3.48
Ship and boat building	1.51	2.81	1.39	1.96
Other transport equipment manufacturing	1.28	2.54	1.36	2.37
Photographic and scientific equipment manufacturing	1.49	2.76	1.50	2.29
Electronic equipment and appliance manufacturing	1.71	2.99	1.82	2.80
Agricultural machinery manufacturing	1.69	3.07	1.55	2.28
Other industrial machinery & equipment manufacturing	1.68	3.10	1.52	2.23
Prefabricated building manufacturing	1.53	2.54	1.45	2.04
Furniture manufacturing	1.61	2.81	1.40	1.92
Other manufacturing	1.47	2.67	1.25	1.66
Electricity generation	1.53	2.66	3.30	6.73
Electricity transmission	1.40	2.65	3.42	7.23
Electricity supply	2.26	3.66	4.10	8.37
Gas supply	1.49	2.42	2.89	5.72
Water supply	1.94	3.22	2.19	3.89
Residential building construction	1.96	3.11	2.05	2.79
Owner builders	2.43	3.53	2.91	3.62

Non residential building construction	2.14	3.38	3.68	5.33
Non building construction	2.00	3.44	2.35	3.70
Site preparation services	1.81	3.16	1.96	2.92
Building structure services	1.75	3.07	1.46	1.94
Plumbing services	1.75	3.05	1.56	2.09
Installation trade services	1.67	2.96	1.53	2.13
Building completion services	1.73	3.10	1.39	1.80
Other construction services	1.69	3.06	1.44	1.96
Wholesale trade	1.54	2.85	1.60	2.50
Retail trade	1.59	3.13	1.27	1.68
Accommodation	1.67	3.03	1.23	1.55
Bars, clubs, cafes and restaurants	1.73	2.99	1.26	1.56
Road freight transport	1.77	3.20	1.89	2.76
Road passenger transport	1.58	3.17	1.28	1.69
Water and rail transport	1.53	3.17	1.71	3.20
Air transport, services to transport and storage	1.48	2.66	1.63	2.61
Communication services	1.37	2.67	1.52	2.70
Finance	1.45	3.06	1.56	2.71
Life insurance	1.92	3.41	2.61	4.02
Superannuation fund operation	2.21	3.43	4.00	5.72
Health insurance	1.81	3.55	1.63	2.40
General insurance	1.49	2.88	1.71	2.84
Services to finance and insurance	1.61	3.08	1.61	2.41
Residential property operators	1.49	2.24	24.19	42.01
Commercial property operators	1.31	2.45	1.46	2.49
Real estate agents	2.02	3.56	1.90	2.51
Ownership of owner-occupied dwellings	1.35	4.15	12.72	65.70
Investors in other property	2.11	3.19	4.44	6.17
Vehicle and equipment hire	1.54	2.57	1.86	2.80
Scientific research	1.45	3.46	1.32	2.03
Technical services	1.54	3.19	1.43	2.15
Computer services	1.47	3.02	1.51	2.45
Legal services	1.37	3.05	1.28	1.90
Accounting services	1.39	3.20	1.28	1.88
Advertising and marketing services	1.63	2.97	1.79	2.88
Business administrative and management services	1.45	2.86	1.30	1.80
Employment, security and investigative services	1.46	3.30	1.32	1.96
Pest control and cleaning services	1.37	3.34	1.20	1.66
Other business services	1.70	3.15	1.46	1.97
Central government administration	1.74	3.53	1.57	2.30
Defence	1.35	3.25	1.24	1.92
Public order and safety services	1.25	3.56	1.14	1.76
Local government administration services and civil defence	1.82	3.35	2.30	3.63
Pre-school education	1.40	3.67	1.17	1.55
Primary and secondary education	1.26	3.53	1.11	1.55
Post school education	1.41	3.60	1.25	1.97
Other education	1.57	3.38	1.27	1.64
Hospitals and nursing homes	1.32	3.48	1.24	1.99
Medical, dental and other health service	1.44	3.02	1.31	1.81
Veterinary services	1.42	3.07	1.26	1.75
Child care services	1.43	3.58	1.13	1.33
Accommodation for the aged	1.53	3.52	1.22	1.56
Other community care services	1.62	3.66	1.38	1.88
Motion picture, radio and TV services	1.52	2.90	1.71	2.79
Libraries, museums and the arts	1.76	3.52	1.35	1.73
Horse and dog racing	1.93	3.21	1.77	2.33
Lotteries, casinos and other gambling	1.36	2.57	1.56	2.74
Other sport and recreational services	1.87	3.24	1.69	2.29
Personal and other community services	1.59	3.33	1.21	1.51
Waste disposal, sewerage and drainage services	1.74	3.17	1.64	2.22
Household sector	0.00	3.87	0.00	0.00