



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Comparing the academic impact of research by New Zealand and Australian universities 1981-2005



This report forms part of a series called Research and knowledge creation.

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1 Summary

This report is one of a series of bibliometric studies of the performance of New Zealand universities. The first report in the series - *(ex)Citing research: a bibliometric analysis of New Zealand university research 1981-2005* - focussed solely on the New Zealand universities. This new report uses the same newly unified bibliometric database from Thomson Scientific to compare the academic impact of research, measured by the number of citations per publication, at New Zealand and Australian universities between 1981 and 2005 across a variety of subject areas. This report marks the first time that a comprehensive international benchmarking exercise has been carried out on the research performance of New Zealand universities across so many subject areas. It also forms part of the evaluation of the Performance-Based Research Fund (PBRF).

This report uses a relative measure of research performance, the average number of citations per publication at a group of universities divided by the world average of citations per publication, in each subject field, to compare performance. By taking this approach, it avoids the problem of citation inflation and allows for comparisons among subject fields, something not possible using raw citations.¹

There are important caveats that apply when using bibliometric data to analyse research performance. For example, subject disciplines such as the social sciences and humanities are not well covered by bibliometric databases based on journals. As a result, the analysis of research impact in this report does not capture all of the research by New Zealand universities and any interpretation of results should take this into account. Readers of this report should refer to the first report in this series - *(ex)Citing research: a bibliometric analysis of New Zealand university research 1981-2005* – as a full account of the methodology and caveats surrounding the use of bibliometrics are presented in that report.

To align the results of this report with the previous report, the 106 narrow subject areas in the Thomson Scientific database were aggregated into 10 of the 12 broad areas used in the PBRF to group disciplines – the PBRF subject panels. The two omitted PBRF panels were 'Māori knowledge and development' and 'creative arts'.²

In this report, the performance of the New Zealand universities was compared with the two groupings of Australian universities – the Group of Eight (G8) and the non-Group of Eight (non-G8). The G8 universities are a collection of well-established universities that are generally more focused on research. Their performance is expected to be higher than that of the non-G8 universities.

The relative performance of the New Zealand universities relative to that of the G8 and non-G8 universities is discussed by PBRF panel area below:

- *Engineering, technology and architecture*: the relative research impact of the combined New Zealand universities was below that achieved by the G8 and non-G8 universities for the entire 25-year period of the analysis. However, one New Zealand university, Victoria University of Wellington (VUW), achieved a relative impact above the G8 and non-G8 universities in the most recent five-year period (2001-2005).
- *Mathematical and information sciences and technology*: the combined New Zealand universities generally achieved a relative research impact score that was below that of the G8 universities but above the non-G8 universities over the 25-year period between 1981 and 2005. In the most recent five-year period (2001-2005), two New Zealand universities, VUW

¹ See section 4.2 in Smart and Weusten (2007) for a detailed explanation.

² See section 4.1 in Smart and Weusten (2007) for the reasons for their omission.

and the University of Waikato achieved a relative research impact score above that of the G8 and non-G8 universities.

- *Physical sciences*: generally, the relative impact of research in the combined New Zealand universities has been below the G8 universities but above the non-G8 universities over the 25-year period of the analysis between 1981 and 2005.
- *Biological sciences*: the relative impact of research at the combined New Zealand universities over the 25 years of the analysis has been below that of the G8 universities but above the non-G8 universities. However, the relative research impact scores at two universities, Auckland and Otago, approach that of the G8 universities in the most recent five-year period (2001-2005).
- *Medicine and public health*: for a significant period (1983-1987 to 1992-1996), the relative impact of research by the combined New Zealand universities was above that of the G8 and non-G8 universities. However, in recent periods the relative impact of research by the combined New Zealand universities has been less than the G8 universities but above the non-G8 universities.
- *Health*: in this panel, the relative impact of research by the combined New Zealand universities has either been either above or of a similar magnitude to that of the G8 universities and above that of the non-G8 universities.
- *Business and economics*: with two short exceptions, the relative impact of research by the combined New Zealand universities has been below that of the G8 but above the non-G8 universities. However, in the most recent five year period (2001-2005) the relative impact of research at the University of Auckland was above that of the G8 and non-G8 universities.
- *Education*: since the 1993-1997 period, the relative impact of research in the education panel has been well below that of the G8 and non-G8 universities. It is notable that in the most recent five year period (2001-2005) the University of Auckland achieved a relative research impact score well above that of the G8 and non-G8 universities.
- *Social sciences and other cultural/social studies*: for most of the period since 1993-1994 the relative impact of research by the combined New Zealand universities has been above that achieved by the G8 and non-G8 universities, although in the last three time periods (1999-2003, 2000-2004 and 2001-2005) the scores of the three groupings have been relatively similar. In the most recent five-year period (2001-2005), the University of Otago achieved a relative research impact score well in excess of that achieved by the G8 and non-G8 universities.
- *Humanities and law*: for most of the 25-year period of analysis the relative impact of research by the combined New Zealand universities has been around the same level as that achieved by the G8 universities. In the most recent five-year period (2001-2005), VUW and the University of Waikato both achieved relative research impact scores in excess of the G8 and non-G8 universities.

An aggregation of the narrow subject areas into the broad PBRF subject panels can mask the performance of the universities in specialist research areas. An analysis of research impact in narrow subject areas for the period 2001-2005 showed that in several subject areas the research by New Zealand universities had an impact above that of the G8 and non-G8 universities. However, there was a wider range in the relative impact of research across the narrow subject areas in the combined New

Zealand universities than in the G8 universities; the performance of the G8 universities has been relatively stable over the 25-year period covered by this study.

Overall, the impact of the research at New Zealand universities was on average below that of the G8 but above the non-G8 universities. However, in a number of individual universities and narrow subject areas, New Zealand universities outperformed the G8 and non-G8 universities. This would suggest that New Zealand has several specialised pockets of high-impact research.

Continued monitoring of New Zealand universities and the G8 and non-G8 universities will be necessary to assess how the introduction of performance-based funding of research, in the form of the Performance-Based Research Fund in New Zealand and the Research Quality Framework in Australia, will affect the impact of research.

2 Introduction

This report is one of a series that examines the research performance of New Zealand universities using a newly unified bibliometric database from Thomson Scientific. An earlier report in the series – *(ex)Citing research: a bibliometric analysis of New Zealand university research 1981-2005*³ - analysed the academic impact of research, in the form of citations per publication, by New Zealand universities in a multitude of subject areas. This new report extends this analysis by comparing the performance of the New Zealand universities with that of their Australian counterparts.⁴

Although New Zealand has a well developed system of measurement of research quality in the form of the Performance-Based Research Fund (PBRF), the specialised nature of this measurement system makes it impractical to use for comparisons with other countries. This leaves bibliometric data as one of the few robust ways to undertake a cross country comparison of research performance.

International benchmarking of bibliometric performance is becoming increasingly common. Australian universities are arguably the most similar in make-up and structure to New Zealand universities, making them the logical benchmark. A number of recent bibliometric studies have compared the performance of Australasian academic departments and individuals in similar fields. Dale and Goldfinch (2005) compared the performance of New Zealand and Australian politics departments using data from Thomson Scientific's Web of Science. Macri and Sinha (2006) analysed the performance of academics at New Zealand and Australian economics departments using the EconLit database.

By comparing the academic impact of research at New Zealand and Australian universities across 97 narrow subject areas, this new report provides a detailed and comprehensive comparison of research performance between New Zealand and Australian universities. The report uses two groupings of Australian universities, the Group of Eight (G8) and the non-Group of Eight (non-G8), as the basis of comparison. The G8 universities are older, more established universities with a strong research focus. The member universities of the G8 group are: the University of Melbourne, the University of Adelaide, the University of Western Australia, the University of Queensland, Monash University, Australian National University, the University of Sydney and the University of New South Wales.

The non-G8 universities are the remaining Australian universities. These comprise a number of older universities,⁵ but the majority are made up of institutions that were previously technical institutes and were granted university status in the Dawkins reforms of the late 1980s and early 1990s. Given that the age of a university has been found to be a factor influencing institutional research performance, it is to be expected that the non-G8 universities generally have a lower level of research performance than the G8 universities.

This report has the following structure. In section 3 the dataset and methodology used in the report is outlined. In section 4 the relative research impact of New Zealand and Australian universities by PBRF subject panel is analysed. In section 5 the performance of New Zealand and Australian universities is compared across narrow subject areas. And in section 6 some final conclusions are presented.

³ Smart and Weusten (2007).

⁴ It is important that this report is read in conjunction with the previous report. The previous report contains a full discussion of the measure of performance used in this report and caveats about the construction of the dataset and interpretation of results.

⁵ For example, the University of Tasmania.

3 Data and method

The reader should refer to the first report in this series – *(ex)Citing research: a bibliometric analysis of New Zealand university research 1981-2005* – for a full discussion on the caveats that surround the use of bibliometrics, the Thomson Scientific dataset used in the analysis and the rationale for the relative impact measure.

This report uses the Thomson Scientific Australian and New Zealand De-luxe bibliometric databases as the source of citations data. These databases contain the number of publications listed in the Thomson Scientific databases between 1981 and 2005 by authors at Australian and New Zealand universities and their associated citations. Specifically, this report uses a relative measure of citations per publication in five-year overlapping periods to measure research impact. In each five-year period, all the citations associated with publications newly listed in the Thomson Scientific database during that period are taken into account when generating the citations per paper measure.⁶

In the analysis that examines narrow subject areas, only those universities that had 25 or more publications listed in the Thomson Scientific database during the five-year period are included in the analysis. This helps to avoid any issues where one or two highly cited publications can skew the performance of the universities.

The measure of research performance used in this report is relative impact. This is calculated as the average number of citations per paper at an institution, divided by the world average citations per paper. This allows for a comparison among subject areas and over time.⁷

The mapping used to aggregate the Thomson Scientific narrow subject areas into the PBRF subject panels is provided in Appendix B of this report.

⁶ Citations to publications that were listed in the Thomson Scientific database prior to the start of a five-year window are not captured in this analysis.

⁷ See section 4.2 in Smart and Weusten (2007) for a fuller discussion on the reasons for using the relative research impact measure.

4 Results by PBRF panel

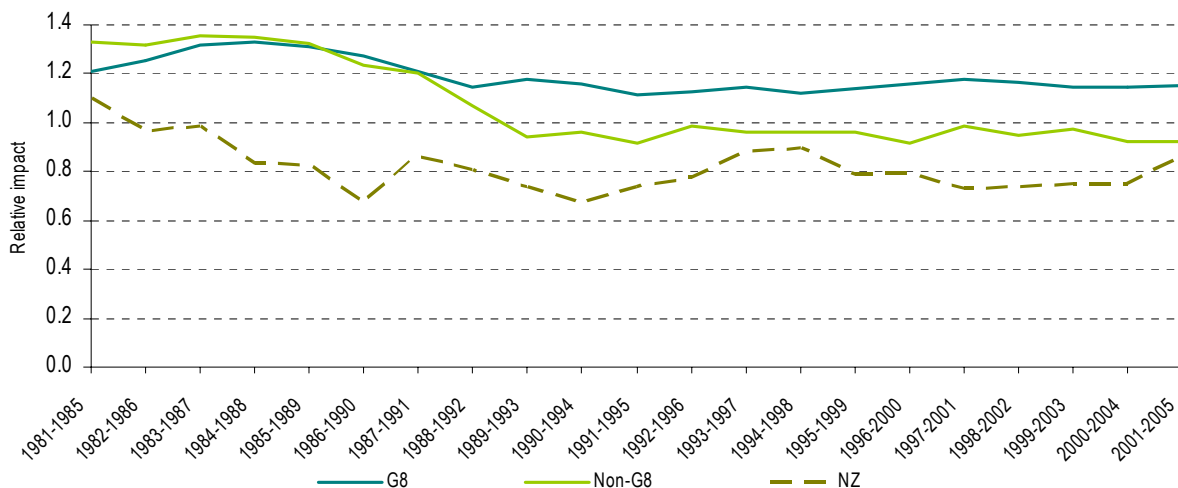
In this section, a time series analysis of the academic impact of research at G8, non-G8 and New Zealand universities over the period 1981-1985 to 2001-2005 is presented by PBRF subject panel. In addition, the performance of each New Zealand university is compared with that of the G8 and non-G8 universities in the most recent five-year period (2001-2005).

In the graphs that accompany this analysis the number of articles on which the relative impact measure is based is included in brackets after the university's name.⁸ Also, in the graphs that examine the relative impact of university research over time, a score of greater than 1 indicates that the academic impact of the research is above the world average.

4.1 Engineering, technology and architecture

The relative impact of research at the New Zealand universities in the 'engineering, technology and architecture' panel has been lower than that of the G8 and the non-G8 Australian universities throughout the 25-year period. However, the gap in performance, which was at its greatest in the late 1980s, has closed considerably over time. The latest five-year period in particular has seen a significant closing of this gap.

Figure 1: Relative impact in 'engineering, technology and architecture' by university grouping

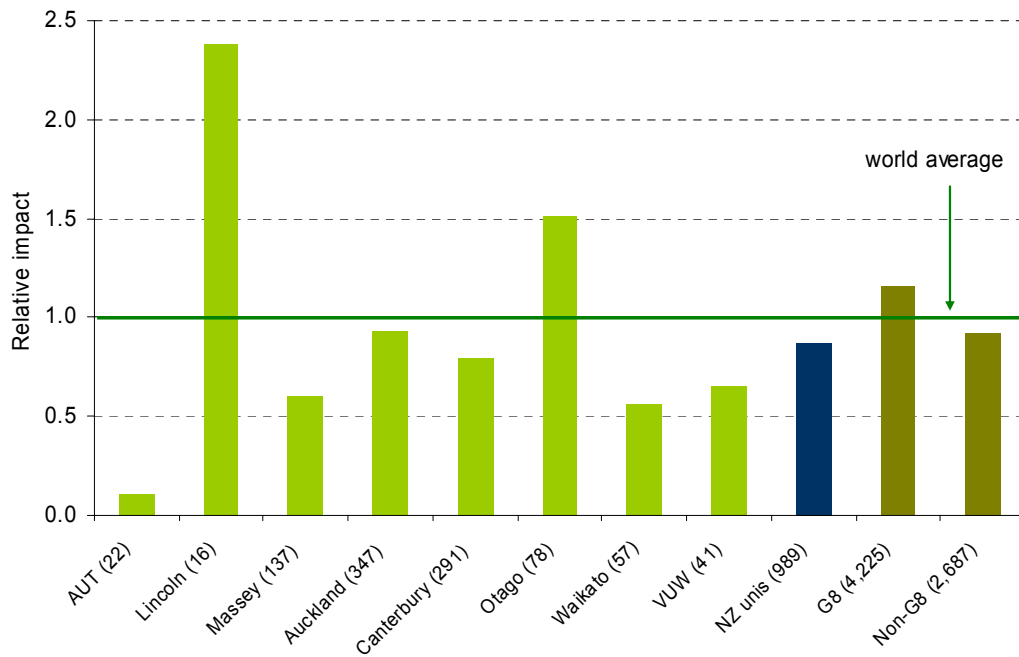


Source: Thomson Scientific

Figure 2 presents the relative impact of all the New Zealand universities in the 'engineering, technology and architecture' panel. Of the two New Zealand universities with the greatest output in this field, the Universities of Auckland and Canterbury, the performance of the University of Auckland is of a similar level to that of the non-G8 universities but remains below the performance of the G8 universities. The high relative impact of Lincoln University is based on just 16 publications and should therefore be treated with caution.

⁸ Note that the issue of double counting will inflate the value of these counts.

Figure 2: Relative impact in 'engineering, technology and architecture' by university 2001-2005

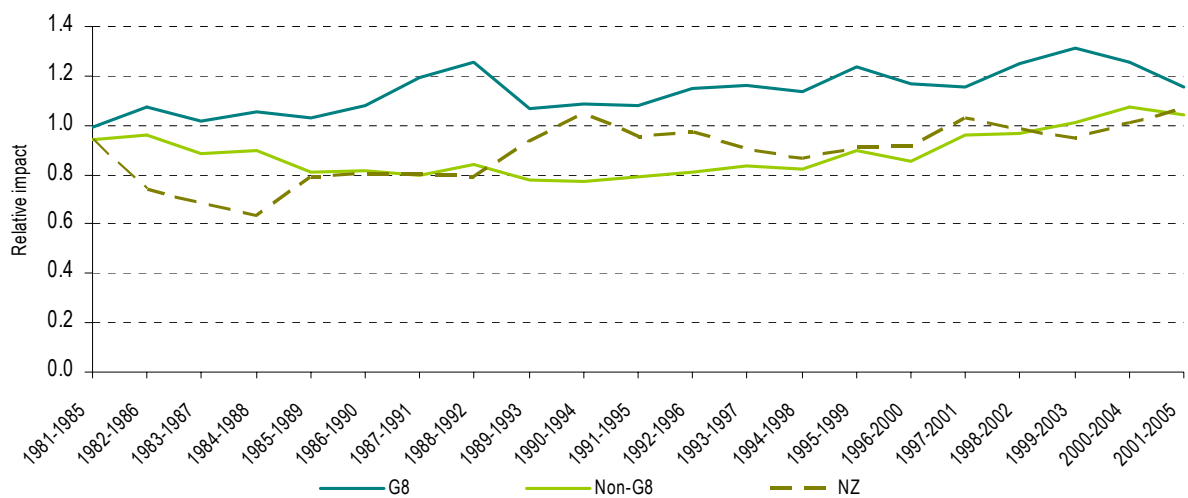


Source: Thomson Scientific

4.2 Mathematical and information sciences and technology

In the 'mathematical, information sciences and technology' panel, the New Zealand universities have reduced the gap in research impact to the G8 universities significantly over time. In the latest five-year period (2001-2005), the relative impact of research at the three groupings is of a relatively similar level.

Figure 3: Relative impact in 'mathematical and information sciences and technology' by university grouping

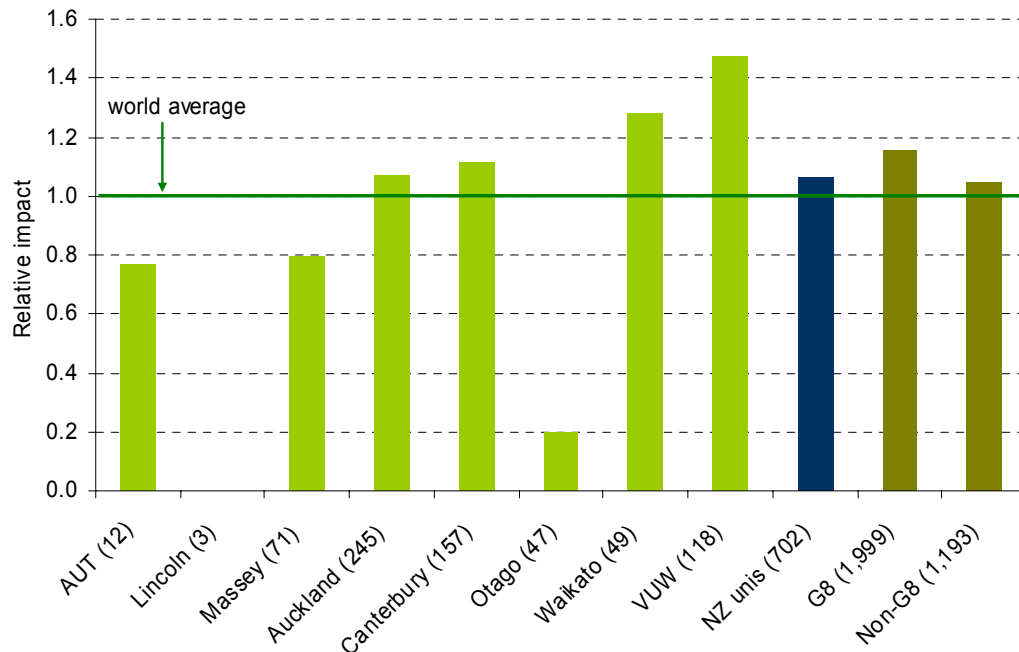


Source: Thomson Scientific

When including the relative impact for individual universities in the most recent time period (2001-2005), several New Zealand universities perform at a level that is higher than the Australian university

groupings. Victoria University of Wellington (VUW) and the University of Waikato both achieved a relative impact score that was higher than the G8 average, although the number of papers at the latter university especially was somewhat lower than other New Zealand universities.

Figure 4: Relative impact in ‘mathematical and information sciences and technology’ by university 2001-2005

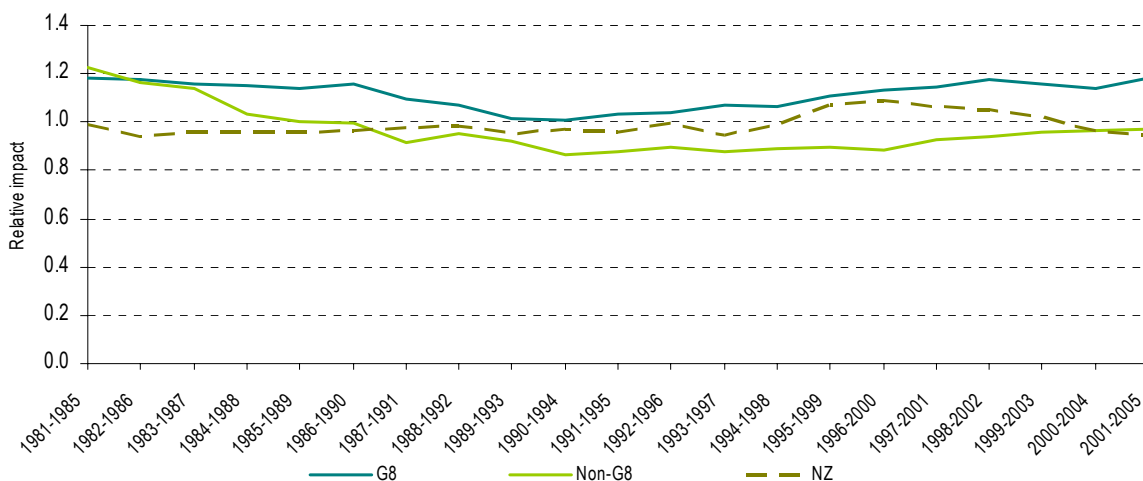


Source: Thomson Scientific

4.3 Physical sciences

In the ‘physical sciences’ panel the New Zealand universities have generally performed at a level that was above the non-G8 universities and approached that of the G8 universities. However, a decline in relative impact that began in the 1995-1999 period has seen the gap in relative impact increase between the New Zealand and G8 universities.

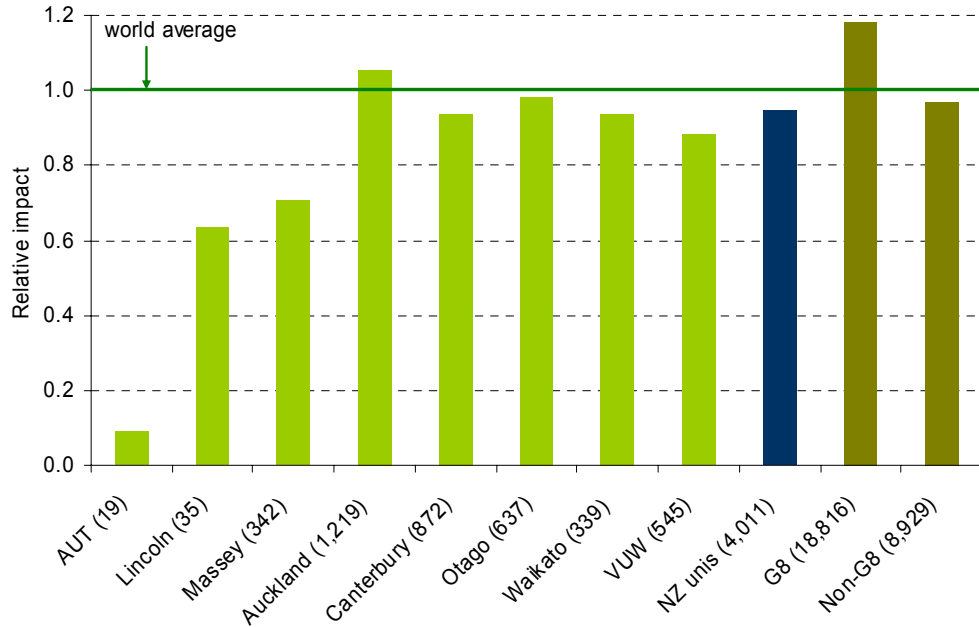
Figure 5: Relative impact in ‘physical sciences’ by university grouping



Source: Thomson Scientific

When including individual universities in the comparison for the most recent five-year period (2001-2005), it is apparent that among the New Zealand institutions, the performance of the University of Auckland is closest to that of the G8 universities.

Figure 6: Relative impact in 'physical sciences' by university 2001-2005

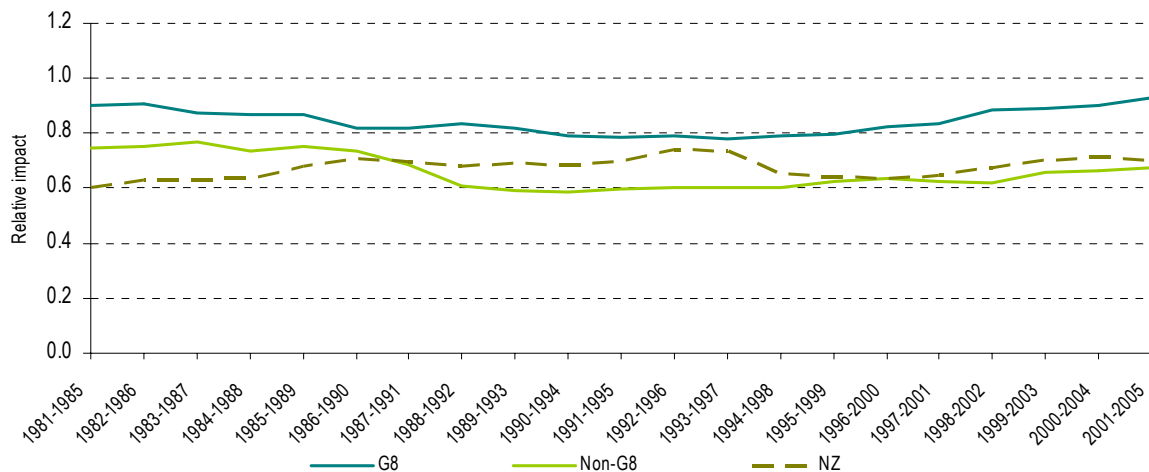


Source: Thomson Scientific

4.4 Biological sciences

The relative impact of research by New Zealand universities in the 'biological sciences' panel has remained below that of the G8 universities throughout the 25-year period. The gap between the New Zealand and G8 universities was at its narrowest point in the 1992-1996 period. However, since that time the gap in relative impact has once again increased. In the most recent five-year period (2001-2005) the relative impact of New Zealand university research in this panel is just above that of the non-G8 universities. It is also worth noting that all three groupings of universities have a relative research impact that is below the world average for the entire 25-year time period.

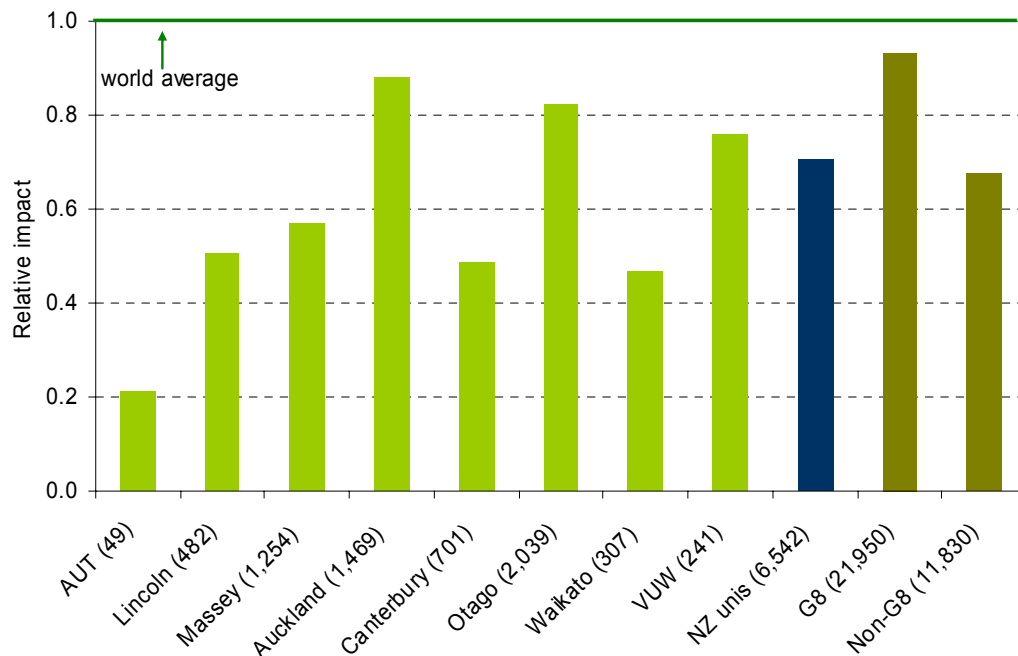
Figure 7: Relative impact of research in 'biological sciences' by university grouping



Source: Thomson Scientific

The picture is somewhat better from a New Zealand perspective when including the performance of individual New Zealand universities in the analysis for the most recent five-year period (2001-2005), with the performance of the Universities of Auckland and Otago approaching the level of the G8 universities

Figure 8: Relative impact of research in 'biological sciences' by university 2001-2005

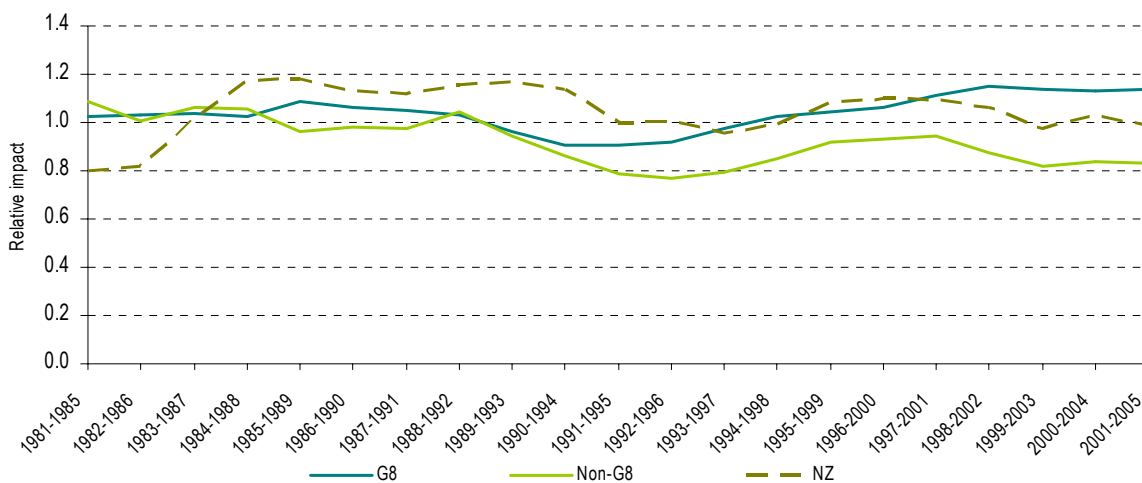


Source: Thomson Scientific

4.5 Medicine and public health

As can be seen in Figure 9, for a significant period the relative impact of research at New Zealand universities was greater than that exhibited by the G8 universities. Since 1997-2001, the relative impact of New Zealand university research has dropped below that of the G8 universities, due to a fall in the relative impact of research at New Zealand universities.

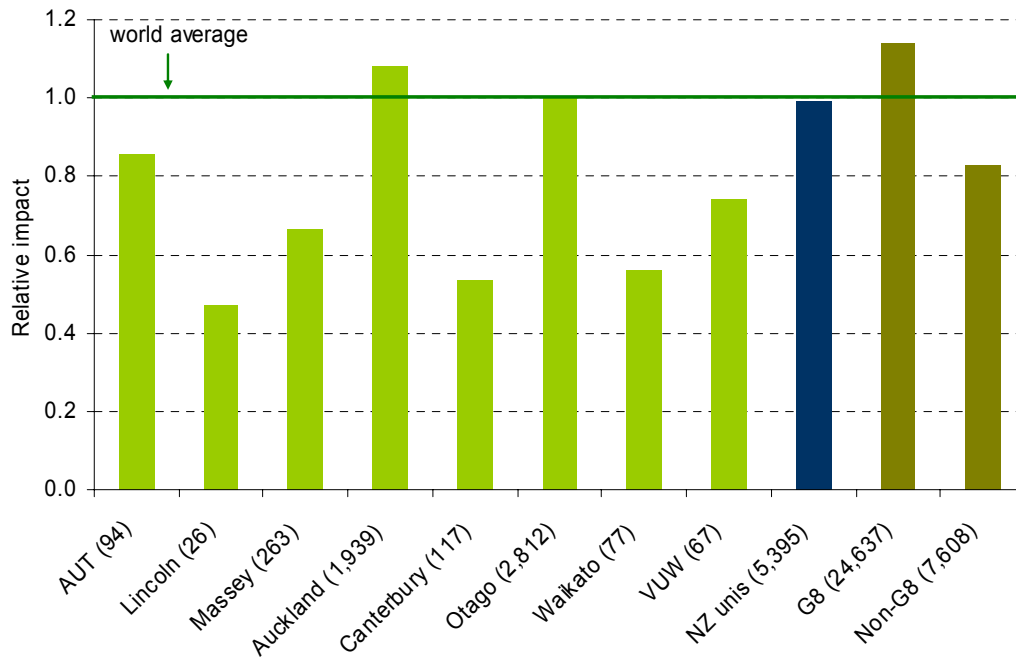
Figure 9: Relative impact in 'medicine and public health' by university grouping



Source: Thomson Scientific

The inclusion of the individual universities in the analysis for the most recent five year period (2001-2005) shows that the gap in performance of some New Zealand institutions to the G8 universities is closer than indicated by the New Zealand university average. The University of Auckland in particular achieved a relative research impact score that was just below that of the G8 universities and well above that of the non-G8 universities.

Figure 10: Relative impact in ‘medicine and public health’ by university 2001-2005

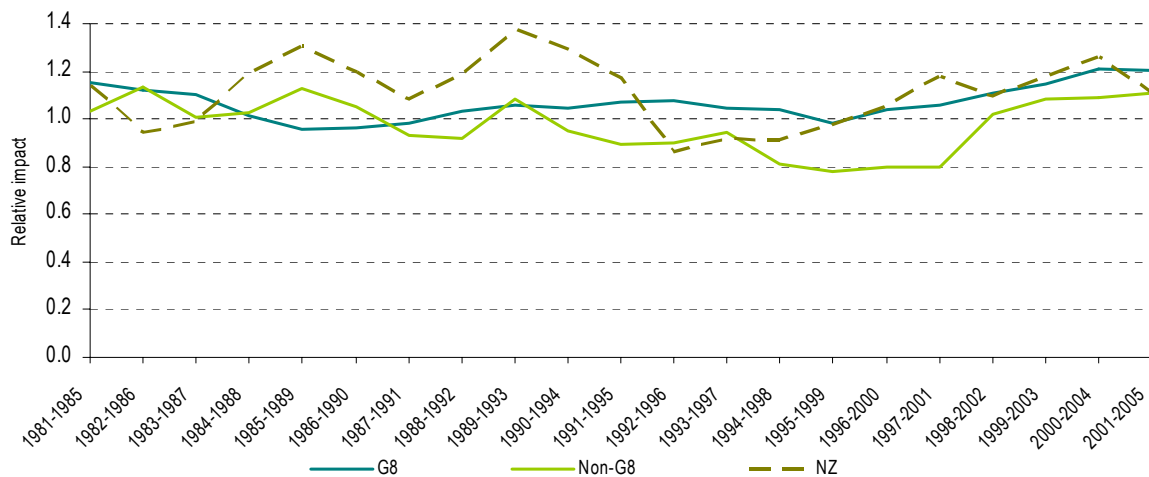


Source: Thomson Scientific

4.6 Health

The performance of New Zealand universities in the ‘health’ panel is the strongest of the 10 panels analysed in this report. At times the relative impact of research at the New Zealand universities has been well above the Australian level of performance. However, a dip in performance at the New Zealand universities in the most recent five-year period has seen the relative impact fall slightly below that at the G8 universities.

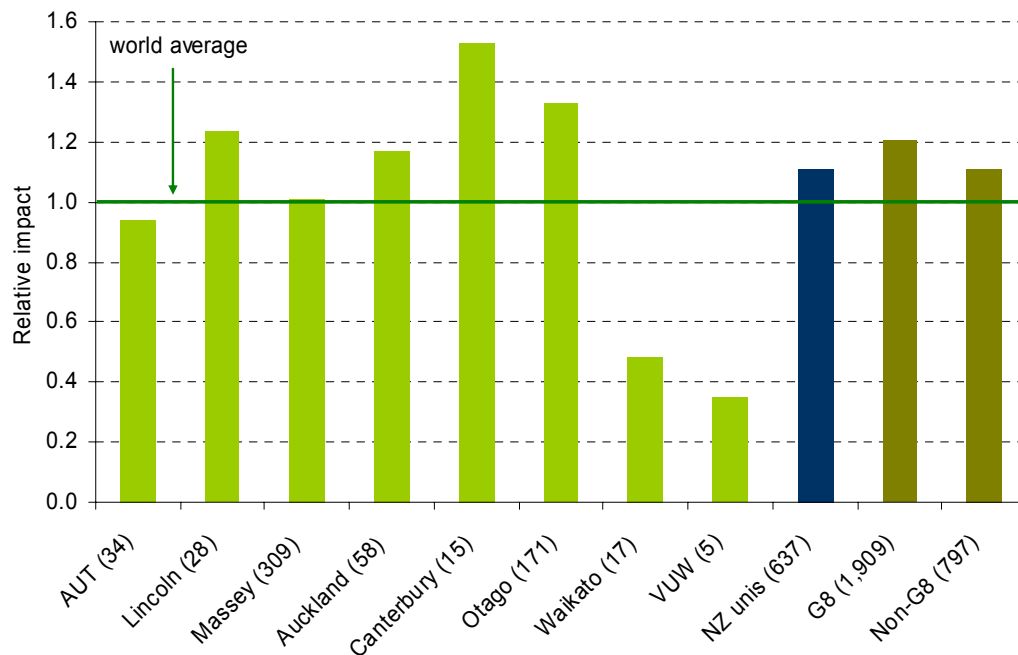
Figure 11: Relative impact in ‘health’ by university grouping



Source: Thomson Scientific

The inclusion of the individual New Zealand universities in the analysis shows that the performance of some individual universities was quite strong. In the most recent time period (2001-2005) the performance of the University of Otago was higher than that of the G8 universities. Although the University of Canterbury and Lincoln University also exhibited a high relative impact score, this was from only 15 and 28 publications respectively.

Figure 12: Relative impact in 'health' by university 2001-2005

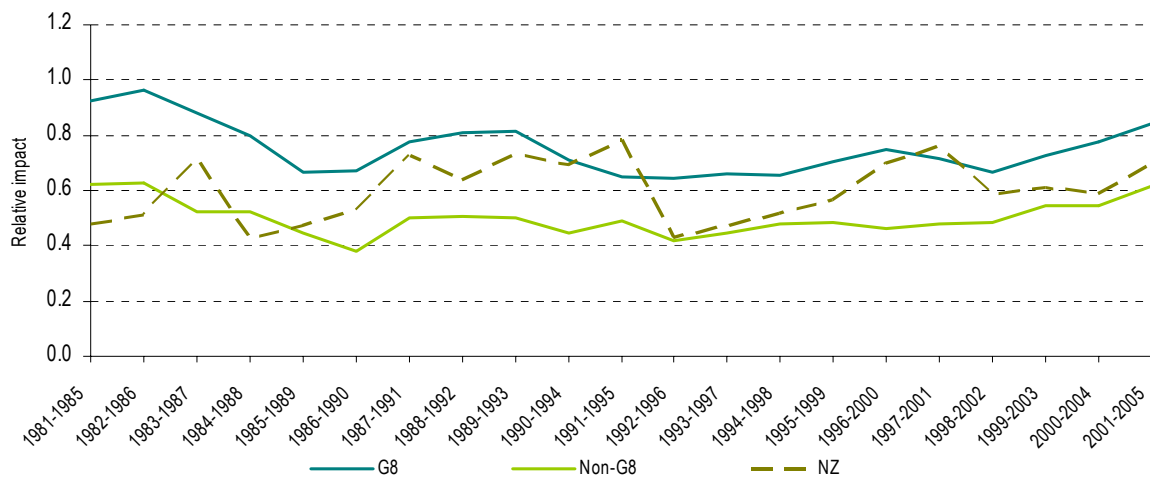


Source: Thomson Scientific

4.7 Business and economics

With only two short exceptions, the relative impact of research at New Zealand universities in the 'business and economics' panel area has remained below that of the G8 universities. However, the relative impact for New Zealand universities has remained above the non-G8 universities since the 1985-1989 period.

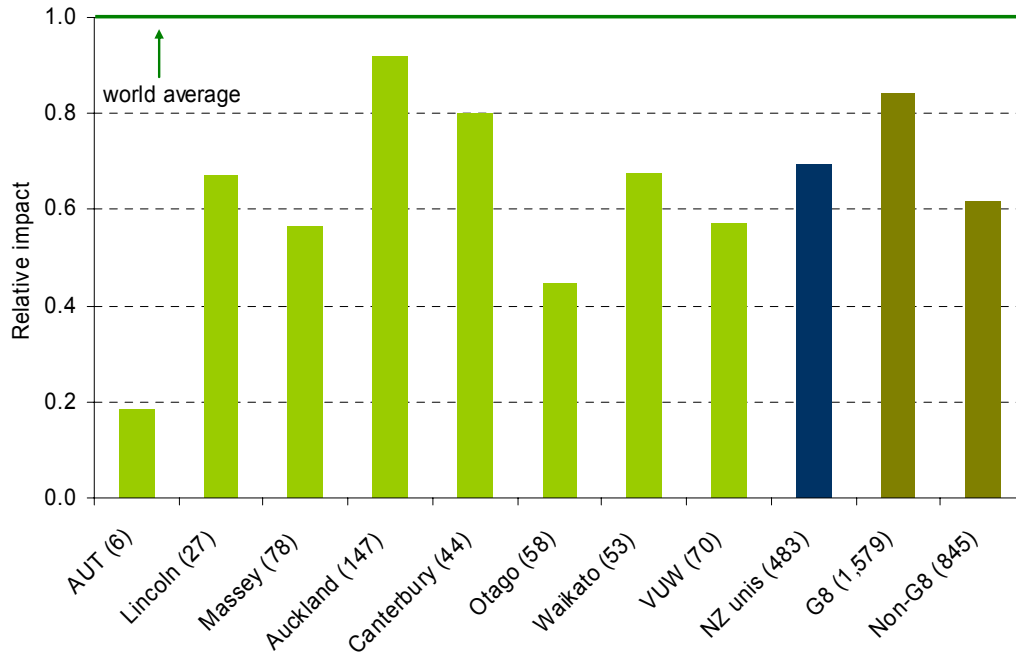
Figure 13: Relative impact in 'business and economics' by university grouping



Source: Thomson Scientific

With the inclusion of individual New Zealand universities for the most recent time period (2001-2005), it becomes clear that the relative impact of research by the University of Auckland exceeded that of the G8 universities.

Figure 14: Relative impact of research in 'business and economics' by university 2001-2005

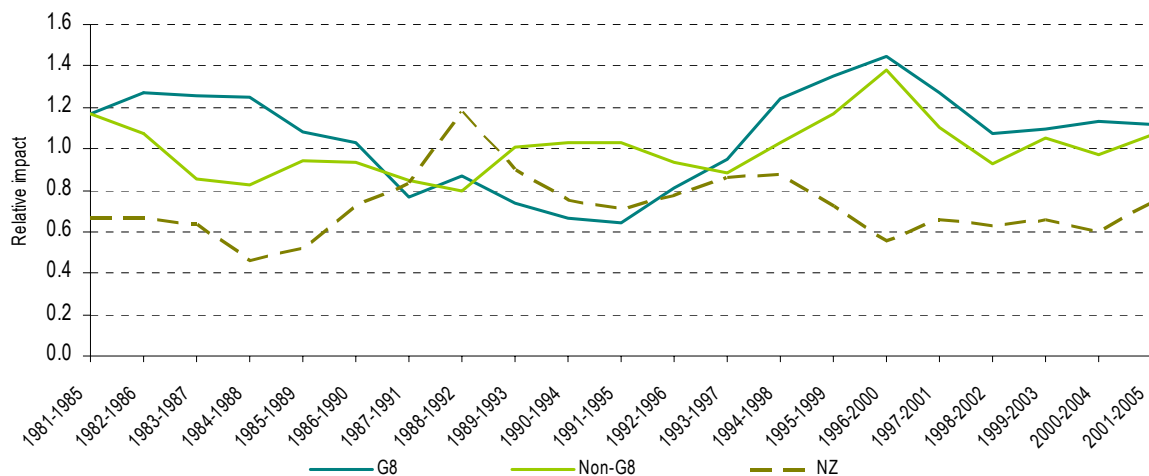


Source: Thomson Scientific

4.8 Education

In the 'education' panel the performance of the New Zealand universities is significantly below that of both the G8 and non-G8 universities from 1993-1997 onwards. This followed an extended period where the relative impact of research at New Zealand universities was above that of the G8 universities.

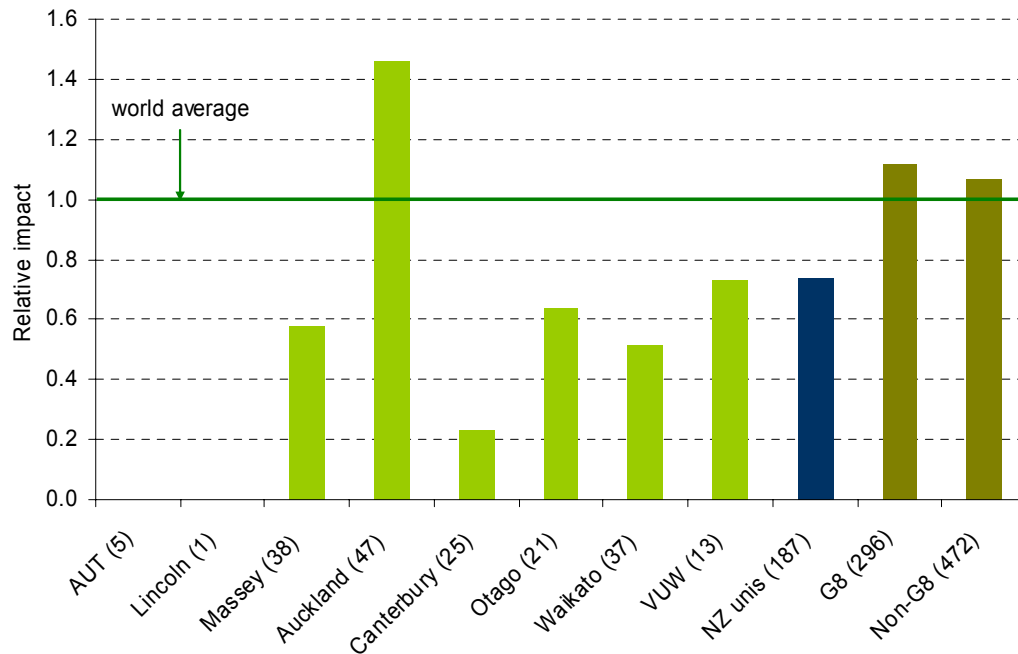
Figure 15: Relative impact in 'education' by university grouping



Source: Thomson Scientific

The inclusion of individual New Zealand universities in the analysis for the most recent five-year period (2001-2005) shows that the performance of the University of Auckland far exceeded that of the G8 and non-G8 universities. Note that because of the way the relative impact measure is calculated, the influence of the New Zealand colleges of education does not impact on this measure.

Figure 16: Relative impact in 'education' by university 2001-2005

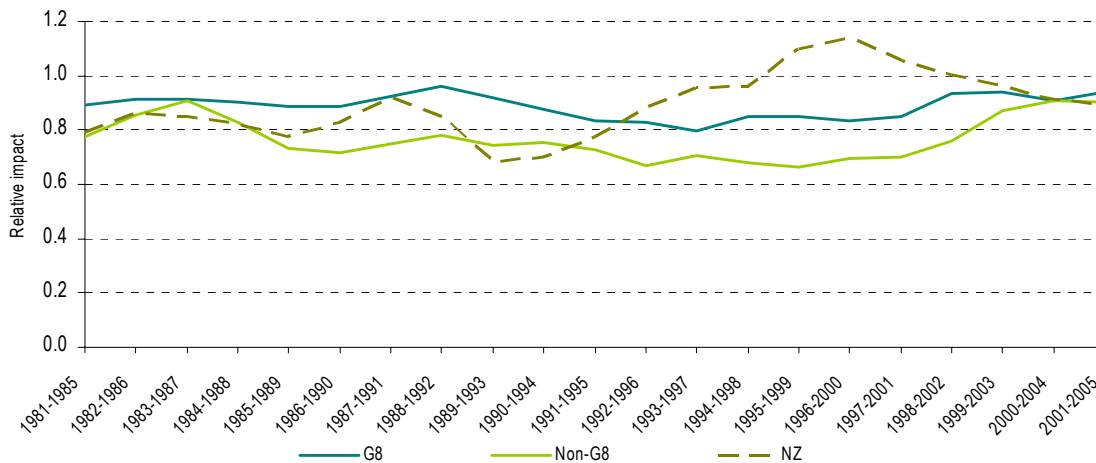


Source: Thomson Scientific

4.9 Social sciences and other cultural/social studies

The relative impact of research at the New Zealand universities in the 'social sciences and other cultural/social studies' panel was higher than both the G8 and non-G8 universities for an extended period between 1991-1995 and 2000-2004. It was only during the most recent five-year period (2001-2005) that the relative impact of New Zealand university research slipped slightly below the level achieved by the Australian universities.

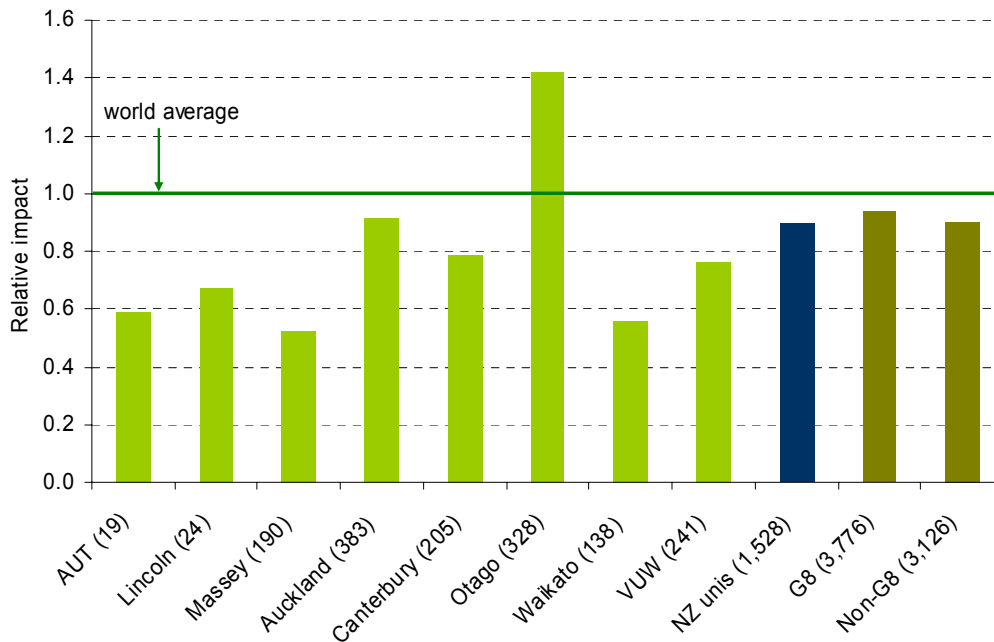
Figure 17: Relative impact in 'social sciences and other cultural/social studies' by university grouping



Source: Thomson Scientific

When the relative impact of research of individual New Zealand universities is included for the most recent five-year period (2001-2005), the performance of the University of Otago is well above that achieved by the G8 and non-G8 universities.

Figure 18: Relative impact in 'social sciences and other cultural/social studies' by university 2001-2005

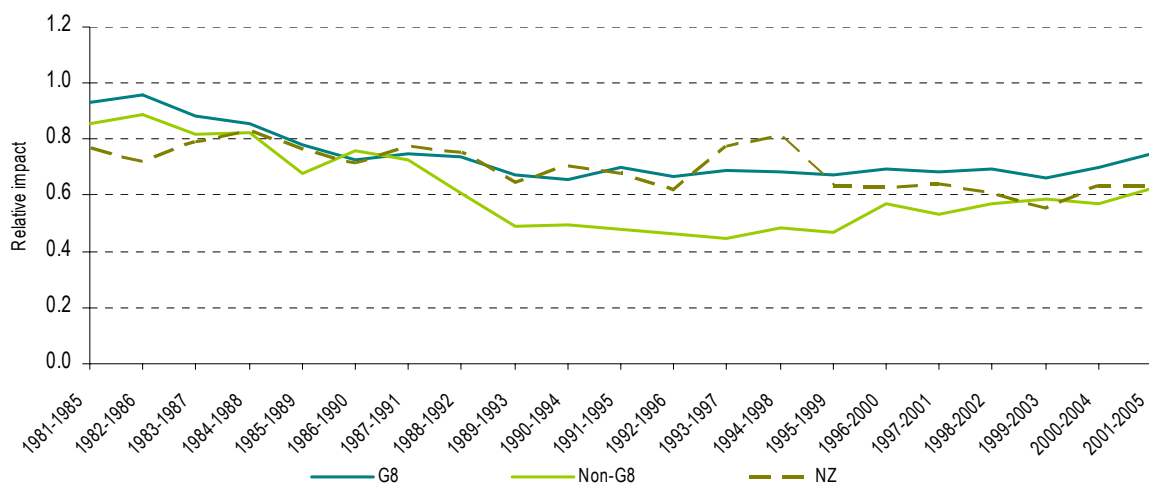


Source: Thomson Scientific

4.10 Humanities and law

The relative impact of research at New Zealand universities has tracked along a similar path to that of the G8 universities for the majority of the 25-year period of analysis. Since 1995-1999, the relative impact of New Zealand universities has been slightly below that of the G8 universities but generally above that of the non-G8 universities. It is notable that the relative impact of all three groupings of universities was below the world average for the entire 25-year period of this analysis.

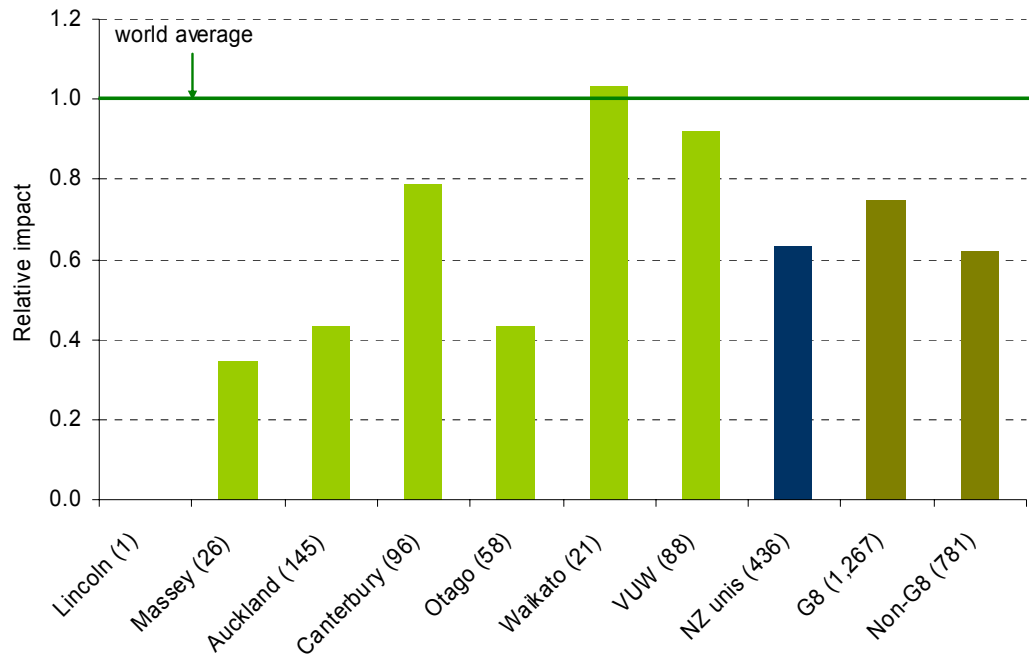
Figure 19: Relative impact in 'humanities and law' by university grouping



Source: Thomson Scientific

At the individual university level, the relative impact of research by VUW and the University of Canterbury exceeds that of the G8 during the most recent five-year period (2001-2005). Although the University of Waikato achieved an even higher relative impact score than VUW, this was based on just 21 publications and should be interpreted with caution.

Figure 20: Relative impact in 'humanities and law' by university 2001-2005



Source: Thomson Scientific

5 Results by narrow subject areas

The comparison of performance at the PBRF panel level in section 4 can mask the performance of universities at the narrow subject level. To provide a more detailed comparison and therefore avoid this problem, the relative impact of research at New Zealand and Australian universities is compared across the narrow subject areas assigned by Thomson Scientific during the most recent five-year period (2001-2005). To avoid the situation where a small number of highly cited publications may skew results in narrow subject areas with few publications, only those narrow subject areas with 25 or more publications in the period 2001-2005 have been included in this analysis. Also, the graphs in this section only present up to 30 of the top-performing narrow subject areas in terms of relative impact at each university. However, tables with the relative impact for all narrow subject areas are presented in Appendix A.

5.1 The impact of university research by narrow subject area

Figure 21 presents the relative impact of research at the combined New Zealand universities and the Australian G8 and non-G8 universities during the 2001-2005 period for the top 30 narrow subject areas in terms of New Zealand university relative research impact. Also included in Figure 21 is the performance of the top individual New Zealand university in each narrow subject area.

The combined New Zealand universities achieved a higher relative impact than either the G8 or non-G8 universities in 22 out of the 97 narrow subject areas. In 29 more, the top New Zealand individual university exceeded the G8 and non-G8 average.⁹

Some of the narrow subject areas where the New Zealand universities exceeded the performance of the G8 and non-G8 universities by some margin were: 'geo/petroleum/mining engineering', 'language and linguistics', 'entomology/pest control', 'archaeology', 'reproductive medicine', 'chemistry', 'food science/nutrition' and 'social work and social policy'.

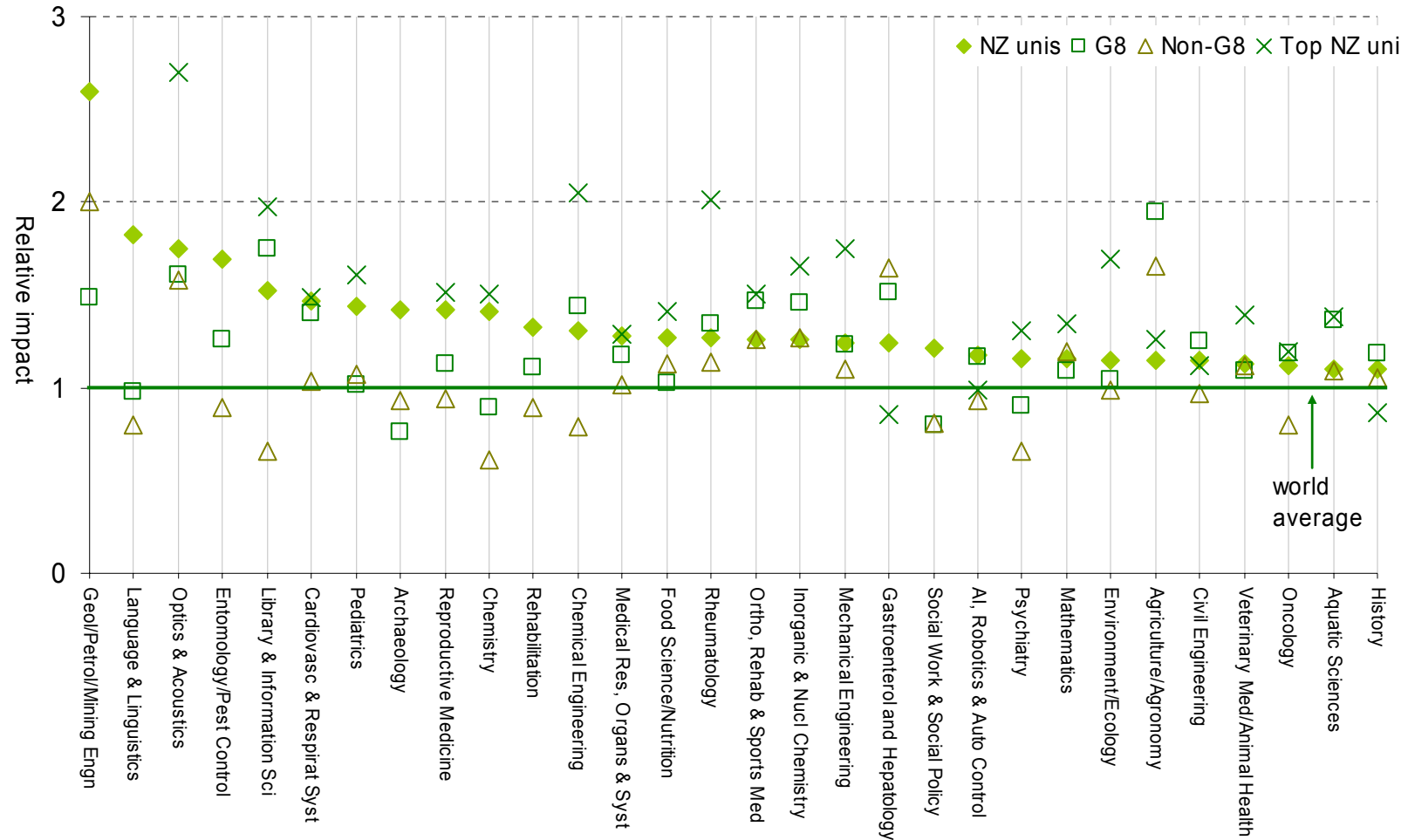
Some of the areas where the top individual New Zealand university achieved a relative impact significantly above the G8 and non-G8 average despite the New Zealand average being lower were: 'optics and acoustics' (University of Auckland), 'chemical engineering' (University of Canterbury), 'rheumatology' (University of Auckland), 'mechanical engineering' (University of Auckland), 'environment ecology' (University of Auckland), 'engineering management/general' (University of Canterbury), 'engineering mathematics' (University of Canterbury), 'cardiovascular and hematology research' (University of Auckland) and 'education' (University of Auckland).

Figure 22 presents boxplots of the relative impact scores in the narrow subject areas for the New Zealand universities and the G8 and non-G8 universities. The mean and median relative impact score at the G8 universities was above that of the combined New Zealand universities. The mean and median relative impact score of the New Zealand universities was slightly above that of the non-G8 universities. Of the individual New Zealand universities, the University of Auckland was arguably the closest to the G8 in terms of average performance. Although Lincoln University achieved a higher median and mean relative impact score than Auckland, this was generated from just six narrow subject areas.

It is apparent from Figure 22 that the variation in relative impact across the narrow subject areas is greater in the New Zealand university sector than in the G8 and non-G8 universities. This suggests that research in New Zealand is more specialised with pockets of very strong relative performance in terms of impact compared with the G8 and non-G8 universities.

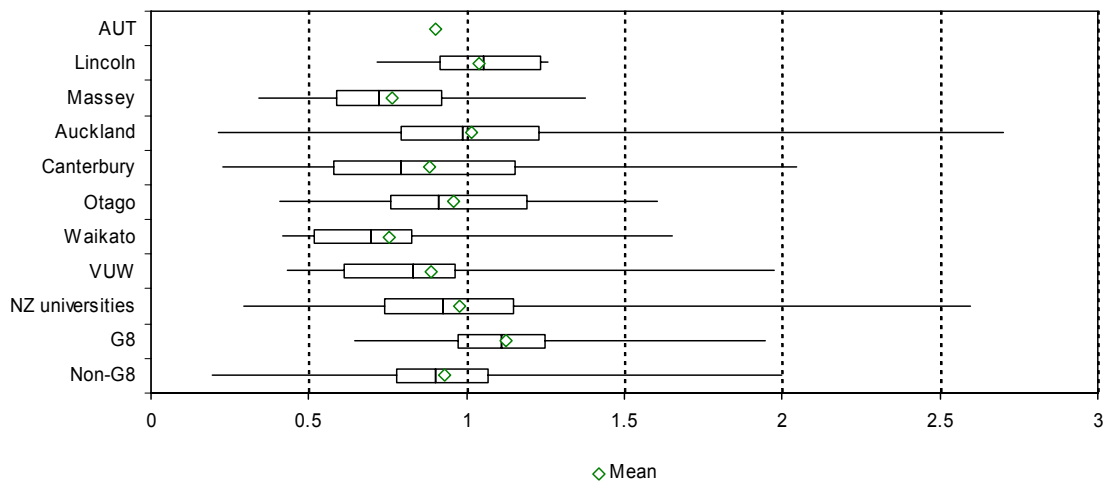
⁹ Of course it is likely in a number of these narrow subject areas that individual G8 and non-G8 universities may have outperformed the top individual New Zealand university.

Figure 21: Relative impact of research by university grouping and narrow subject area 2001-2005



Source: Thomson Scientific

Figure 22: Distribution of relative impact of research by university 2001-2005



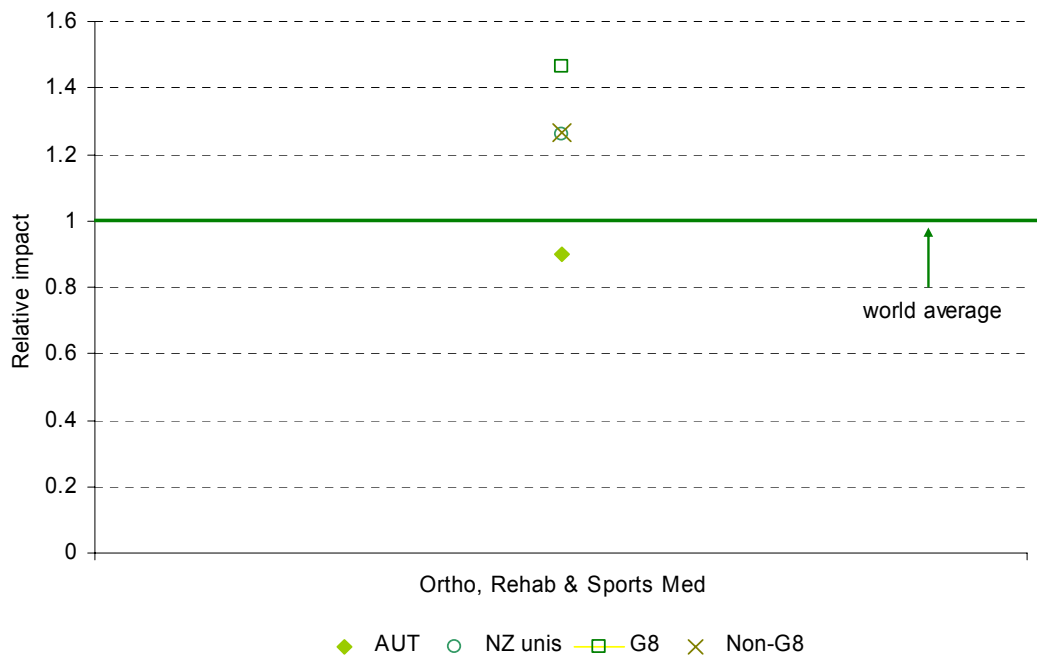
5.2 The impact of individual university research by narrow subject area

Section 5.1 compared the performance of the New Zealand university sector as a whole with the G8 and non-G8 universities. This section compares the performance of each individual university with the G8 and non-G8 universities. This helps to identify the areas of high relative impact at an institution, compared with their Australian counterparts.

5.2.1 Auckland University of Technology

The Auckland University of Technology (AUT) has only one narrow subject area with more than 25 publications in the most recent five-year period - 'orthopaedics, rehabilitation and sports medicine'. The relative impact of research in this area was below that of the G8 and non-G8 universities.

Figure 23: Relative impact of research by Auckland University of Technology compared with G8 and non-G8 universities 2001-2005

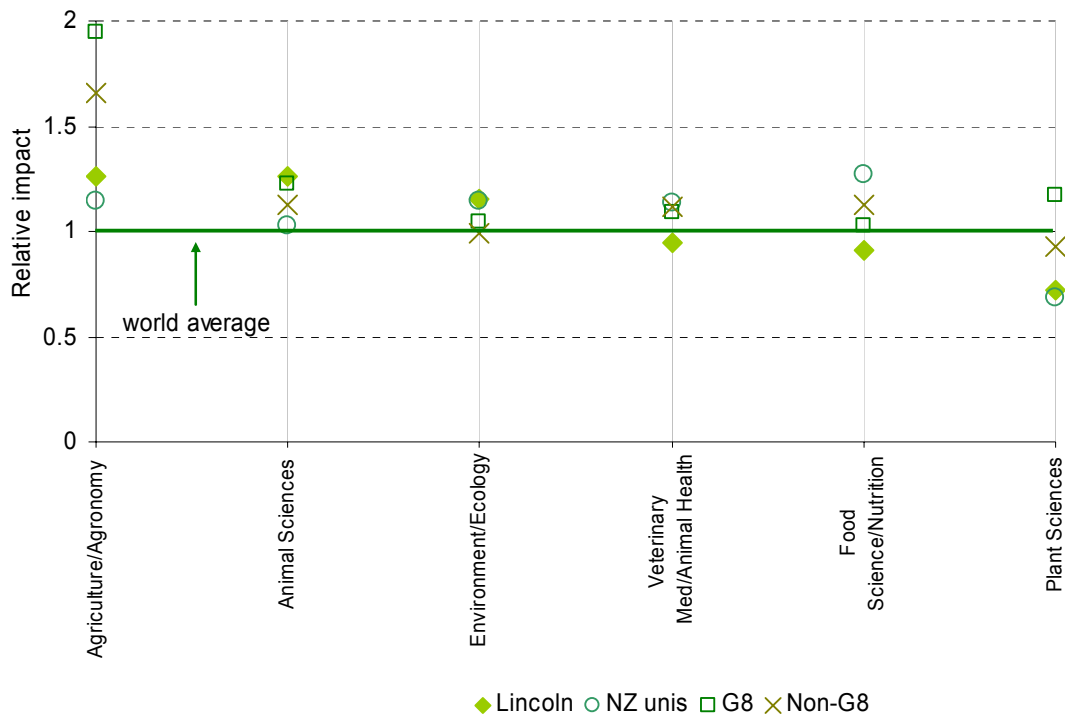


Source: Thomson Scientific

5.2.2 Lincoln University

The relative impact of research at Lincoln University was above the G8 and non-G8 universities in two narrow subject areas – ‘animal sciences’ and ‘environment/ecology’.

Figure 24: Relative impact of research by Lincoln University compared with G8 and non-G8 universities 2001-2005

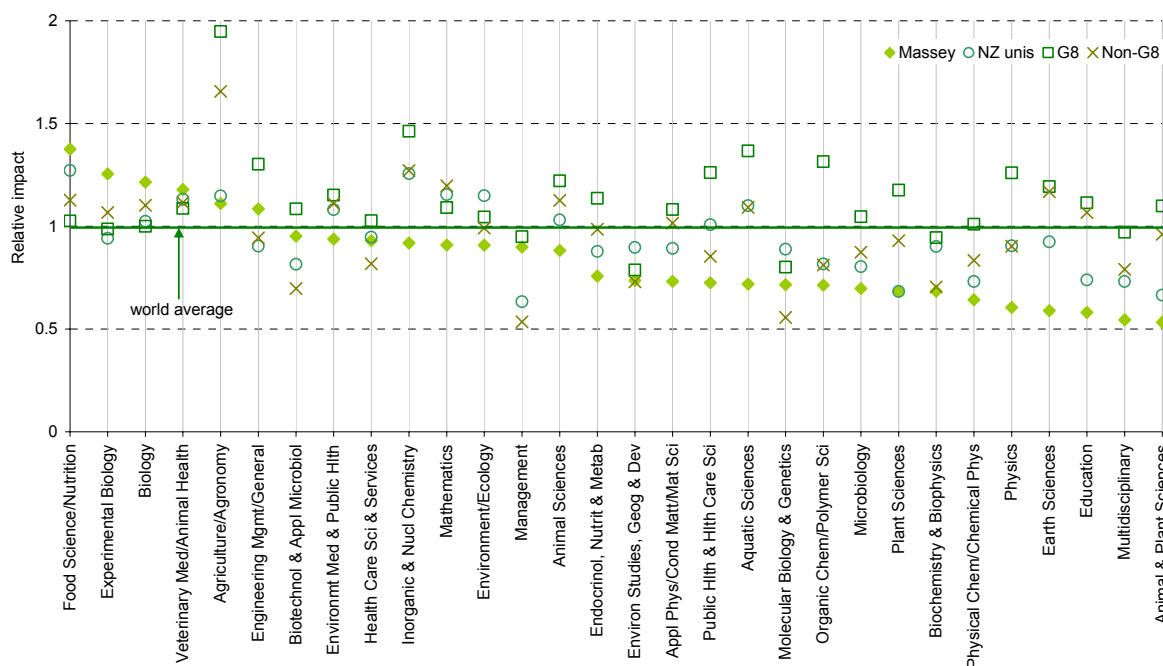


Source: Thomson Scientific

5.2.3 Massey University

Massey University achieved a relative impact above the G8 and non-G8 in four narrow subject areas. These were: 'food science/nutrition', 'experimental biology', 'biology' and 'veterinary medicine/animal health'.

Figure 25: Relative impact of research by Massey University compared with G8 and non-G8 universities 2001-2005

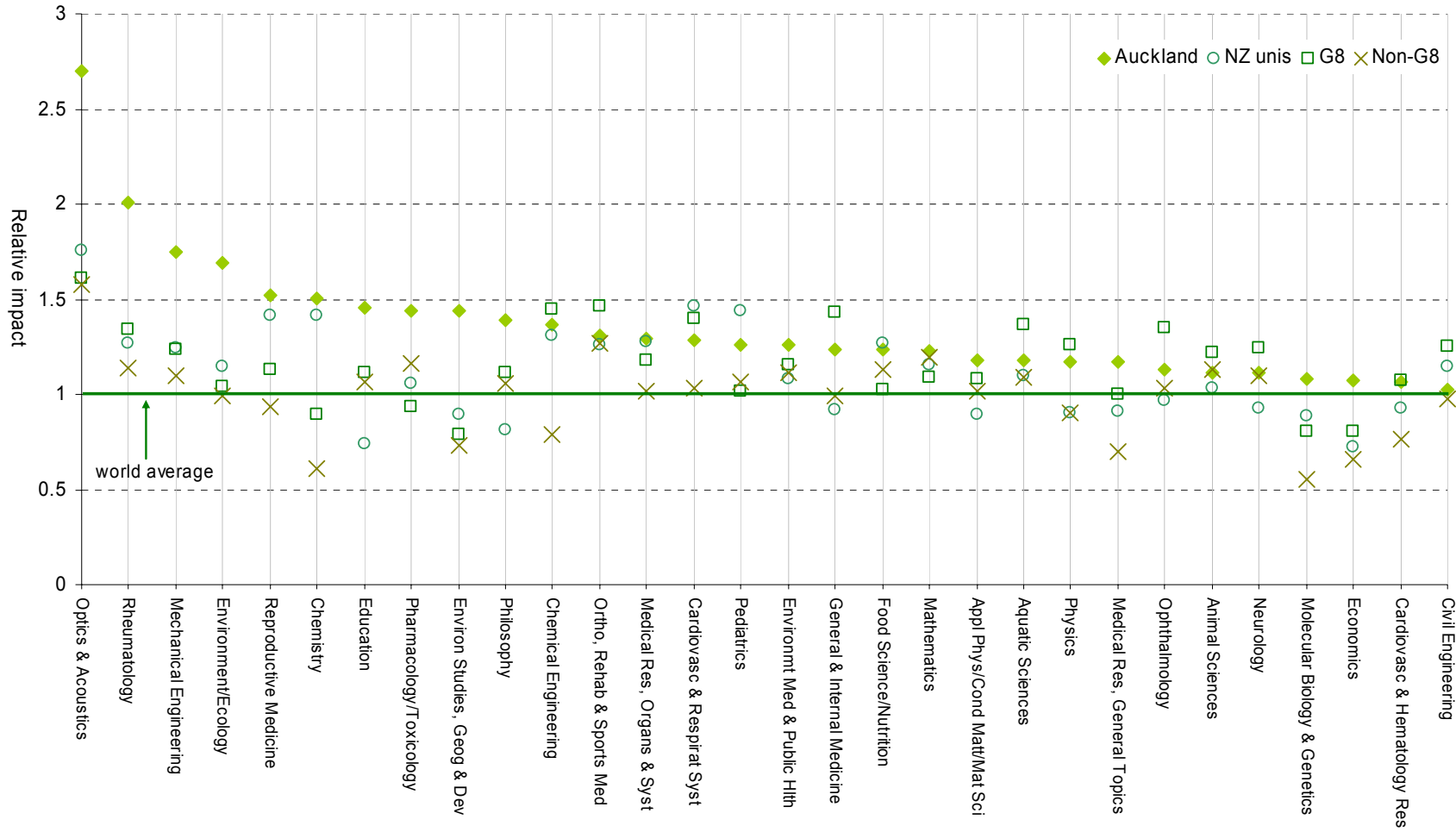


Source: Thomson Scientific

5.2.4 University of Auckland

The University of Auckland had a relative research impact above either the G8 or non-G8 universities in 20 narrow subject areas. These narrow subject areas included: 'optics and acoustics', 'rheumatology', 'mechanical engineering', 'environment/ecology', 'reproductive medicine', 'chemistry' and 'education'.

Figure 26: Relative impact of research by the University of Auckland compared with G8 and non-G8 universities 2001-2005

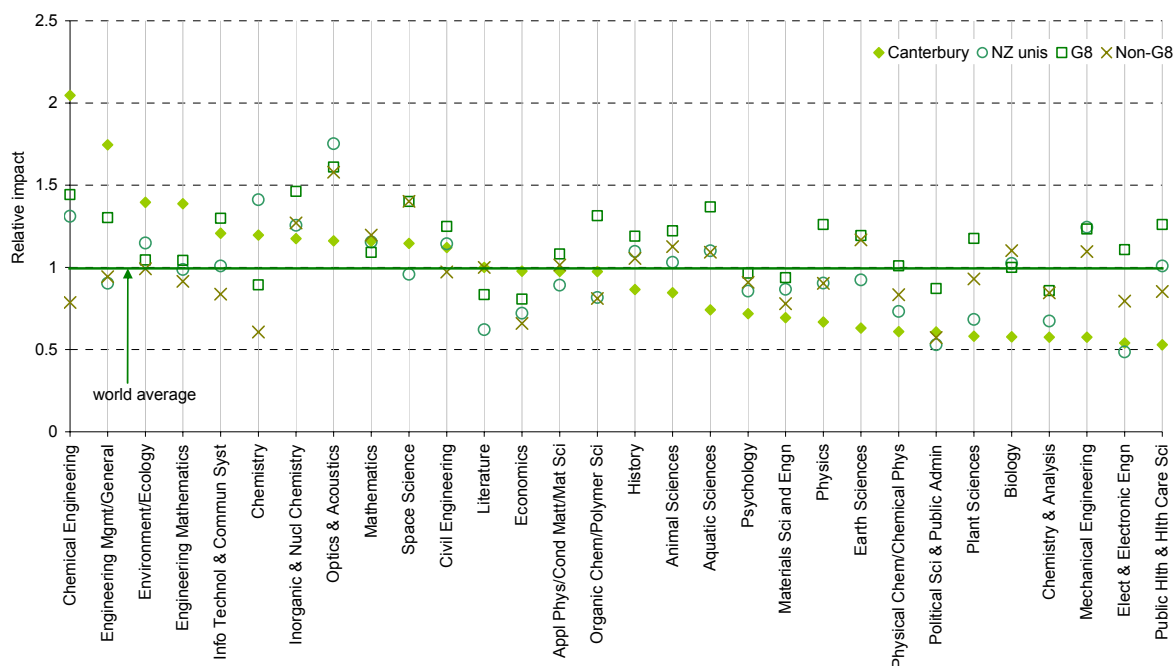


Source: Thomson Scientific

5.2.5 University of Canterbury

The University of Canterbury achieved a relative impact score above that of the G8 and non-G8 universities in six narrow subject areas. It is clear that the performance of the University of Canterbury in the engineering area is strong, as three of the six subject areas are in this field.

Figure 27: Relative impact of research by the University of Canterbury compared with G8 and non-G8 universities 2001-2005

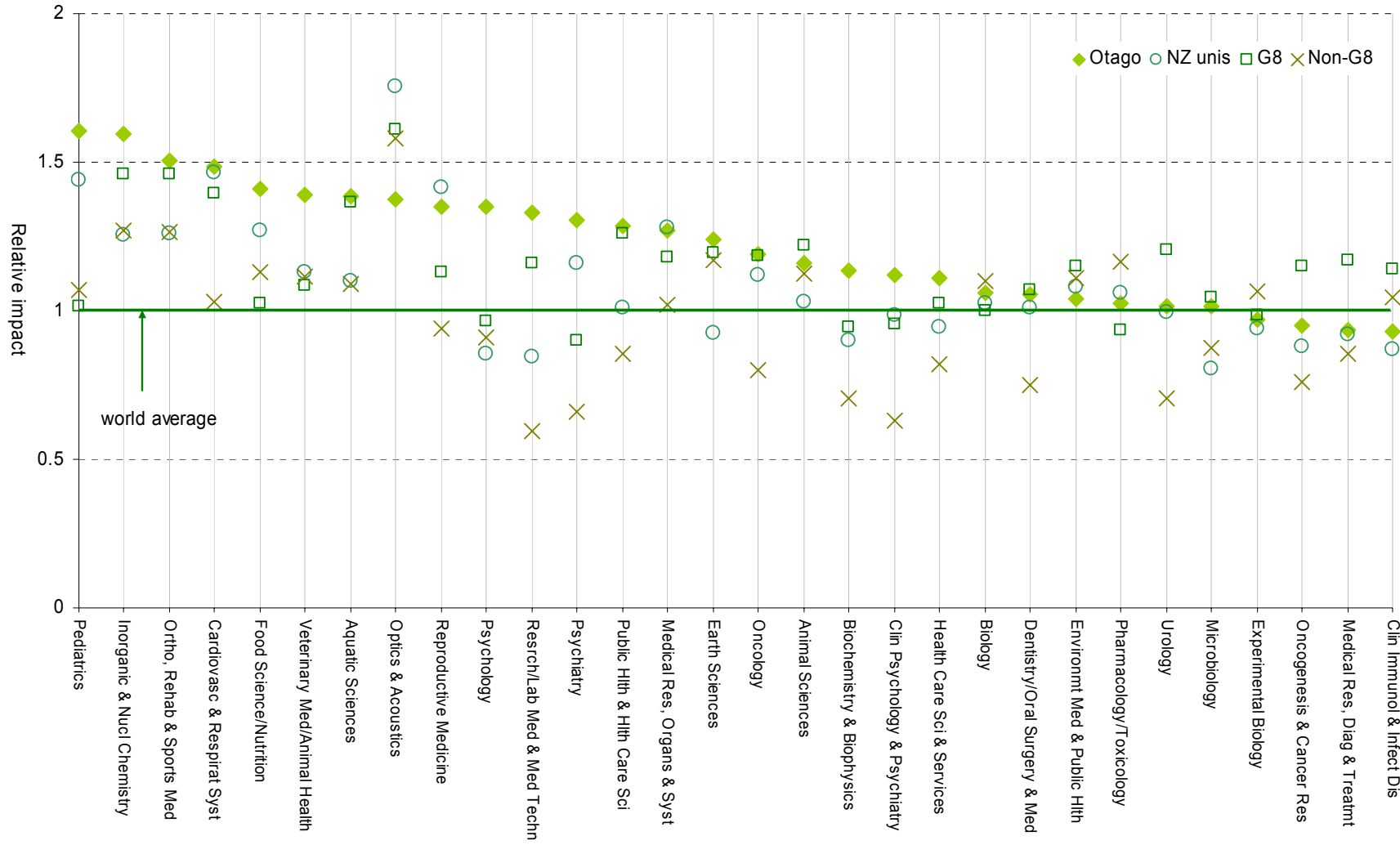


Source: Thomson Scientific

5.2.6 University of Otago

The University of Otago has 17 narrow subject areas with relative impact above that of the G8 and non-G8 universities. Some of the narrow subject areas where the University achieved a noticeably higher relative impact than the Australian universities were: 'pediatrics', 'veterinary medicine/animal health', 'reproductive medicine', 'psychology' and 'psychiatry'.

Figure 28: Relative impact of research by the University of Otago compared with G8 and non-G8 universities 2001-2005

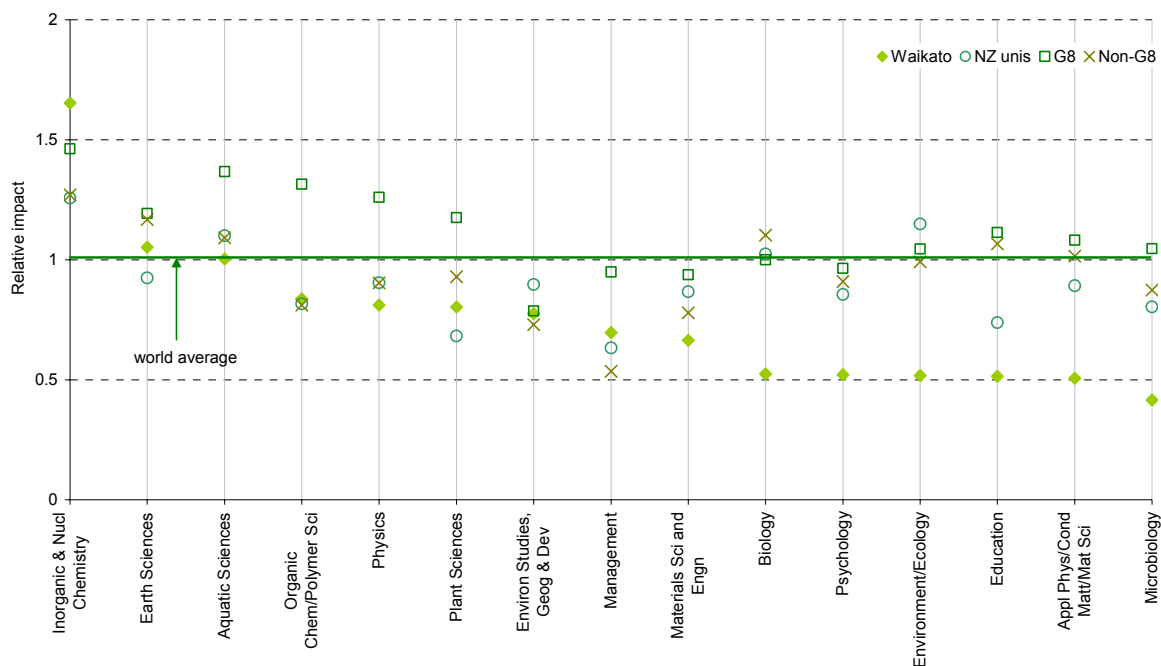


Source: Thomson Scientific

5.2.7 University of Waikato

The University of Waikato achieved a higher relative impact than the G8 and non-G8 universities in one narrow subject area – ‘inorganic and nuclear chemistry’.

Figure 29: Relative impact of research by the University of Waikato compared with G8 and non-G8 universities 2001-2005

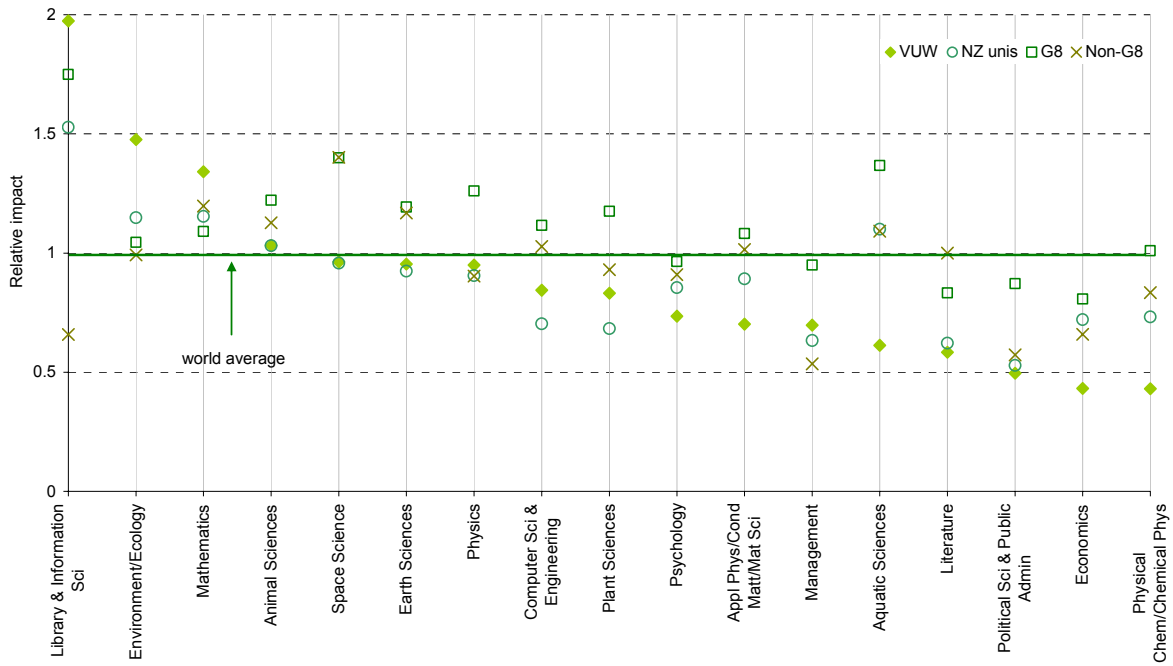


Source: Thomson Scientific

5.2.8 Victoria University of Wellington

Victoria University of Wellington achieved a relative impact score above that of the Australian G8 and non-G8 universities in three narrow subject areas. These were: ‘library and information sciences’, ‘environment/ecology’ and ‘mathematics’.

Figure 30: Relative impact of research by Victoria University of Wellington compared with G8 and non-G8 universities 2001-2005



Source: Thomson Scientific

6 Conclusion

Overall, the Australian G8 universities outperform the combined New Zealand universities in terms of relative academic research impact. This is partly a result of a more even performance of the Australian G8 universities across the 97 narrow subject areas, whereas in the New Zealand institutions, strong relative impact is restricted to a number of subject areas or individual universities. The overall performance of the combined New Zealand universities was higher on average than the non-G8 universities.

This variation in relative academic impact raises some important questions, especially with the full effect of the PBRF now being felt. Will the stronger focus on research result in a narrowing of the gap in performance between the New Zealand universities and the G8 universities? Will the variation in research impact evident in the New Zealand universities be increased as PBRF funding is directed to the more strongly performing research areas? How will the new Australian research assessment and funding system impact on the performance of the Australian universities?

To answer these questions will require continued monitoring of the performance of universities - a task which is possible as the bibliometric databases used in this report can be updated on an annual basis.

Appendix A: Data tables

Table 1: Relative impact of New Zealand university research by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Geol/petrol/mining engn (32)	2.60	Medical res, diag & treatmt (180)	0.92
Language & linguistics (71)	1.82	Medical res, general topics (470)	0.91
Optics & acoustics (132)	1.75	Physics (330)	0.90
Entomology/pest control (73)	1.69	Engineering mgmt/general (139)	0.90
Library & information sci (62)	1.53	Biochemistry & biophysics (358)	0.90
Cardiovasc & respirat syst (210)	1.47	Environ studies, geog & dev (182)	0.90
Pediatrics (241)	1.44	Appl phys/cond matt/mat sci (512)	0.89
Archaeology (41)	1.42	Molecular biology & genetics (233)	0.89
Reproductive medicine (202)	1.42	Oncogenesis & cancer res (150)	0.88
Chemistry (215)	1.41	Endocrinol, nutrit & metab (333)	0.88
Rehabilitation (56)	1.33	Clin immunol & infect dis (86)	0.87
Chemical engineering (128)	1.31	Materials sci and engn (243)	0.87
Medical res, organs & syst (440)	1.28	Anesthesia & intensive care (87)	0.86
Food science/nutrition (341)	1.27	Psychology (844)	0.86
Rheumatology (56)	1.27	Resrch/lab med & med techn (124)	0.84
Ortho, rehab & sports med (129)	1.26	Philosophy (72)	0.82
Inorganic & nucl chemistry (204)	1.26	Organic chem/polymer sci (317)	0.82
Mechanical engineering (128)	1.24	Biotechnol & appl microbiol (104)	0.82
Gastroenterol and hepatology (52)	1.24	Microbiology (406)	0.80
Social work & social policy (48)	1.22	Pharmacology & toxicology (325)	0.79
AI, robotics & auto control (119)	1.18	Endocrinol, metab & nutrit (217)	0.75
Psychiatry (227)	1.16	Surgery (100)	0.74
Mathematics (388)	1.15	Education (187)	0.74
Environment/ecology (834)	1.15	Agricultural chemistry (120)	0.74
Agriculture/agronomy (305)	1.15	Neurosciences & behavior (683)	0.73
Civil engineering (160)	1.14	Phys chem/chemical phys (364)	0.73
Veterinary med/animal health (364)	1.13	Multidisciplinary (352)	0.73
Oncology (109)	1.12	Environmt engineering/energy (99)	0.73
Aquatic sciences (539)	1.10	Economics (301)	0.72
History (101)	1.10	Computer sci & engineering (147)	0.70
Environmt med & public hlth (169)	1.08	Spectrosc/instrum/analyt sci (104)	0.70
Sociology & social sciences (109)	1.07	Plant sciences (555)	0.68
Pharmacology/toxicology (103)	1.06	Chemistry & analysis (366)	0.67
Animal sciences (539)	1.03	Animal & plant sciences (177)	0.67
Biology (332)	1.02	Physiology (162)	0.65
Dentistry/oral surgery & med (88)	1.01	Instrumentation/measurement (51)	0.65
Public hlth & hlth care sci (423)	1.01	Management (182)	0.63
Info technol & commun syst (105)	1.01	Immunology (147)	0.63
Urology (66)	0.99	Literature (134)	0.62
Engineering mathematics (112)	0.99	Hematology (45)	0.56
Clin psychology & psychiatry (225)	0.98	Radiol, nucl med & imaging (46)	0.55
Ophthalmology (134)	0.97	Political sci & public admin (152)	0.53
Space science (175)	0.96	Anthropology (80)	0.52
Otolaryngology (33)	0.95	Cell & developmental biol (120)	0.50
Health care sci & services (95)	0.95	Elect & electronic engn (157)	0.48
Experimental biology (181)	0.94	Communication (72)	0.47
Neurology (150)	0.93	Performing arts (33)	0.29
Earth sciences (875)	0.92		
Cardiovasc & hematology res (188)	0.92		
General & internal medicine (433)	0.92		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 2: Relative impact of research at Auckland University of Technology by narrow subject area 2001-2005

Narrow subject area	Relative impact
Ortho, rehab & sports med (29)	0.90

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.
Source: Thomson Scientific

Table 3: Relative impact of research at Lincoln University by narrow subject area 2001-2005

Narrow subject area	Relative impact
Agriculture/agronomy (112)	1.26
Animal sciences (50)	1.26
Environment/ecology (149)	1.16
Veterinary med/animal health (26)	0.95
Food science/nutrition (25)	0.91
Plant sciences (61)	0.72

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.
Source: Thomson Scientific

Table 4: Relative impact of research at Massey University by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Food science/nutrition (140)	1.38	Molecular biology & genetics (34)	0.72
Experimental biology (33)	1.25	Organic chem/polymer sci (33)	0.71
Biology (69)	1.21	Microbiology (93)	0.70
Veterinary med/animal health (285)	1.18	Plant sciences (106)	0.68
Agriculture/agronomy (133)	1.11	Biochemistry & biophysics (57)	0.68
Engineering mgmt/general (27)	1.08	Physical chem/chemical phys (51)	0.64
Biotechnol & appl microbiol (47)	0.95	Physics (32)	0.61
Environmt med & public hlth (30)	0.94	Earth sciences (50)	0.59
Inorganic & nucl chemistry (27)	0.92	Education (38)	0.58
Mathematics (49)	0.91	Multidisciplinary (34)	0.54
Environment/ecology (144)	0.91	Animal & plant sciences (49)	0.53
Management (27)	0.90	Psychology (112)	0.42
Animal sciences (148)	0.88	Chemistry & analysis (53)	0.41
Endocrinol, nutrit & metab (42)	0.76	Economics (51)	0.36
Environ studies, geog & dev (25)	0.74	Medical res, general topics (34)	0.36
Appl phys/cond matt/mat sci (37)	0.73	Agricultural chemistry (41)	0.34
Public hlth & hlth care sci (63)	0.73	Elect & electronic engn (25)	0.34
Aquatic sciences (27)	0.72		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.
Source: Thomson Scientific

Table 5: Relative impact of research at the University of Auckland by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Optics & acoustics (51)	2.70	Pharmacology & toxicology (120)	0.98
Rheumatology (28)	2.01	Endocrinol, nutrit & metab (122)	0.94
Mechanical engineering (77)	1.75	Public hlth & hlth care sci (118)	0.93
Environment/ecology (118)	1.69	Medical res, diag & treatmt (51)	0.92
Reproductive medicine (95)	1.52	Computer sci & engineering (62)	0.91
Chemistry (70)	1.50	Chemistry & analysis (145)	0.91
Education (47)	1.46	Biology (58)	0.89
Pharmacology/toxicology (32)	1.44	Anesthesia & intensive care (42)	0.87
Environ studies, geog & dev (48)	1.44	Psychiatry (72)	0.86
Philosophy (28)	1.39	Biochemistry & biophysics (109)	0.85
Chemical engineering (60)	1.37	Engineering mathematics (34)	0.85
Ortho, rehab & sports med (39)	1.31	Psychology (194)	0.84
Medical res, organs & syst (187)	1.29	Literature (51)	0.83
Cardiovasc & respirat syst (72)	1.28	Environmt engineering/energy (35)	0.83
Pediatrics (87)	1.26	Earth sciences (218)	0.83
Environmt med & public hlth (46)	1.26	Experimental biology (46)	0.82
General & internal medicine (150)	1.24	Clin psychology & psychiatry (67)	0.82
Food science/nutrition (56)	1.23	Plant sciences (106)	0.79
Mathematics (166)	1.23	Oncogenesis & cancer res (67)	0.78
Appl phys/cond matt/mat sci (144)	1.18	Organic chem/polymer sci (108)	0.76
Aquatic sciences (117)	1.18	Materials sci and engn (110)	0.76
Physics (102)	1.17	Health care sci & services (31)	0.76
Medical res, general topics (166)	1.17	Neurosciences & behavior (259)	0.76
Ophthalmology (86)	1.13	Surgery (42)	0.76
Animal sciences (58)	1.12	Endocrinol, metab & nutrit (82)	0.76
Neurology (64)	1.11	Microbiology (61)	0.71
Molecular biology & genetics (94)	1.08	Anthropology (39)	0.64
Economics (100)	1.07	Management (47)	0.61
Cardiovasc & hematology res (77)	1.07	Cell & developmental biol (51)	0.59
Civil engineering (60)	1.03	Spectrosc/instrum/analyt sci (27)	0.51
Inorganic & nucl chemistry (45)	1.03	Immunology (31)	0.51
Phys chem/chemical phys (102)	1.01	Resrch/lab med & med techn (45)	0.49
Animal & plant sciences (39)	1.00	Political sci & public admin (40)	0.38
Multidisciplinary (104)	1.00	History (29)	0.38
Oncology (48)	1.00	Engineering mgmt/general (40)	0.38
Ai, robotics & auto control (37)	0.99	Elect & electronic engn (32)	0.22
Physiology (73)	0.99		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 6: Relative impact of research at the University of Otago by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Pediatrics (141)	1.60	Neurology (64)	0.88
Inorganic & nucl chemistry (52)	1.60	Chemistry (35)	0.87
Ortho, rehab & sports med (47)	1.51	Medical res, general topics (238)	0.86
Cardiovasc & respirat syst (130)	1.48	Gastroenterol and hepatology (31)	0.86
Food science/nutrition (80)	1.41	Spectrosc/instrum/analyt sci (28)	0.85
Veterinary med/animal health (25)	1.39	Molecular biology & genetics (77)	0.83
Aquatic sciences (222)	1.38	Cardiovasc & hematology res (102)	0.83
Optics & acoustics (30)	1.38	Endocrinol, nutrit & metab (152)	0.83
Reproductive medicine (92)	1.35	Appl phys/cond matt/mat sci (43)	0.82
Psychology (212)	1.35	Physical chem/chemical phys (69)	0.81
Resrch/lab med & med techn (57)	1.33	Endocrinol, metab & nutrit (115)	0.79
Psychiatry (134)	1.31	Physics (43)	0.78
Public hlth & hlth care sci (169)	1.29	Neurosciences & behavior (316)	0.77
Medical res, organs & syst (208)	1.27	Anesthesia & intensive care (39)	0.77
Earth sciences (196)	1.24	General & internal medicine (251)	0.76
Oncology (57)	1.19	Organic chem/polymer sci (29)	0.75
Animal sciences (155)	1.16	Ophthalmology (43)	0.75
Biochemistry & biophysics (133)	1.14	Pharmacology & toxicology (150)	0.74
Clin psychology & psychiatry (139)	1.12	Surgery (54)	0.74
Health care sci & services (47)	1.11	Immunology (84)	0.70
Biology (117)	1.06	Multidisciplinary (99)	0.67
Dentistry/oral surgery & med (84)	1.06	Chemistry & analysis (68)	0.62
Environmt med & public hlth (84)	1.04	Plant sciences (93)	0.58
Pharmacology/toxicology (59)	1.03	Cell & developmental biol (40)	0.54
Urology (57)	1.01	Environ studies, geog & dev (37)	0.48
Microbiology (183)	1.01	Animal & plant sciences (46)	0.46
Experimental biology (60)	0.97	Economics (33)	0.45
Oncogenesis & cancer res (75)	0.95	Physiology (37)	0.44
Medical res, diag & treatmt (120)	0.94	Management (25)	0.42
Clin immunol & infect dis (57)	0.93	Hematology (32)	0.41
Environment/ecology (181)	0.91		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 7: Relative impact of research at the University of Canterbury by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Chemical engineering (35)	2.05	Aquatic sciences (77)	0.74
Engineering mgmt/general (34)	1.75	Psychology (119)	0.72
Environment/ecology (137)	1.40	Materials sci and engn (49)	0.69
Engineering mathematics (36)	1.39	Physics (51)	0.67
Info technol & commun syst (56)	1.21	Earth sciences (141)	0.63
Chemistry (58)	1.20	Physical chem/chemical phys (78)	0.61
Inorganic & nucl chemistry (41)	1.17	Political sci & public admin (28)	0.61
Optics & acoustics (34)	1.16	Plant sciences (128)	0.58
Mathematics (73)	1.16	Biology (40)	0.58
Space science (71)	1.15	Chemistry & analysis (65)	0.58
Civil engineering (71)	1.12	Mechanical engineering (25)	0.57
Literature (25)	1.00	Elect & electronic engn (78)	0.54
Economics (32)	0.98	Public hlth & hlth care sci (25)	0.53
Appl phys/cond matt/mat sci (125)	0.98	Multidisciplinary (67)	0.51
Organic chem/polymer sci (96)	0.97	Neurosciences & behavior (52)	0.46
History (28)	0.86	Microbiology (30)	0.41
Animal sciences (71)	0.85	Education (25)	0.23

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 8: Relative impact of research at the University of Waikato by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Inorganic & nucl chemistry (30)	1.65	Materials sci and engn (35)	0.66
Earth sciences (95)	1.05	Biology (25)	0.52
Aquatic sciences (48)	1.00	Psychology (64)	0.52
Organic chem/polymer sci (29)	0.84	Environment/ecology (51)	0.52
Physics (28)	0.81	Education (37)	0.51
Plant sciences (30)	0.80	Appl phys/cond matt/mat sci (34)	0.51
Environ studies, geog & dev (26)	0.78	Microbiology (30)	0.42
Management (32)	0.70		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 9: Relative impact of research at Victoria University of Wellington by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Physical chem/chemical phys (46)	0.43	Computer sci & engineering (25)	0.84
Economics (38)	0.43	Physics (73)	0.95
Political sci & public admin (38)	0.50	Earth sciences (154)	0.95
Literature (28)	0.58	Space science (41)	0.96
Aquatic sciences (30)	0.61	Animal sciences (32)	1.03
Management (32)	0.70	Mathematics (56)	1.34
Appl phys/cond matt/mat sci (120)	0.70	Environment/ecology (47)	1.48
Psychology (131)	0.73	Library & information sci (34)	1.97
Plant sciences (29)	0.83		

Note: The number in brackets after the narrow subject field is the number of publications listed in the Thomson Scientific database in the 2001-2005 period.

Source: Thomson Scientific

Table 10: Relative impact of research at G8 universities by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Agriculture/agronomy	1.95	Elect & electronic engn	1.11
Library & information sci	1.75	Animal & plant sciences	1.10
Optics & acoustics	1.61	Hematology	1.10
Gastroenterol and Hepatology	1.51	Mathematics	1.09
Geol/petrol/mining engn	1.48	Veterinary med/animal health	1.09
Ortho, rehab & sports med	1.46	Biotechnol & appl microbiol	1.08
Inorganic & nucl chemistry	1.46	Appl phys/cond matt/mat sci	1.08
Chemical engineering	1.44	Anesthesia & intensive care	1.07
General & internal medicine	1.43	Cardiovasc & hematology res	1.07
Performing arts	1.42	Dentistry/oral surgery & med	1.07
Space science	1.40	Microbiology	1.05
Cardiovasc & respirat syst	1.40	Environment/ecology	1.04
Instrumentation/measurement	1.40	Engineering mathematics	1.04
Aquatic sciences	1.37	Health care sci & services	1.03
Ophthalmology	1.35	Food science/nutrition	1.02
Rheumatology	1.34	Pediatrics	1.02
Organic chem/polymer sci	1.31	Pharmacology & toxicology	1.01
Engineering mgmt/general	1.30	Physical chem/chemical phys	1.01
Info technol & commun syst	1.30	Biology	1.00
Surgery	1.27	Medical res, general topics	1.00
Agricultural chemistry	1.26	Experimental biology	0.99
Public hlth & hlth care sci	1.26	Endocrinol, metab & nutrit	0.98
Physics	1.26	Language & linguistics	0.98
Entomology/pest control	1.26	Multidisciplinary	0.97
Civil engineering	1.25	Psychology	0.96
Neurology	1.25	Clin psychology & psychiatry	0.95
Mechanical engineering	1.23	Management	0.95
Animal sciences	1.22	Biochemistry & biophysics	0.94
Urology	1.21	Materials sci and engn	0.94
Spectrosc/instrum/analyt sci	1.20	Pharmacology/toxicology	0.94
Earth sciences	1.19	Anthropology	0.92
History	1.19	Environmt engineering/energy	0.90
Oncology	1.19	Psychiatry	0.90
Medical res, organs & syst	1.18	Chemistry	0.89
Plant sciences	1.18	Neurosciences & behavior	0.87
Otolaryngology	1.17	Political sci & public admin	0.87
Medical res, diag & treatmt	1.17	Immunology	0.87
AI, robotics & auto control	1.17	Communication	0.86
Resrch/lab med & med techn	1.16	Chemistry & analysis	0.86
Environmt med & public hlth	1.15	Sociology & social sciences	0.84
Oncogenesis & cancer res	1.15	Literature	0.83
Clin immunol & infect dis	1.14	Economics	0.81
Endocrinol, nutrit & metab	1.14	Molecular biology & genetics	0.80
Physiology	1.13	Social work & social policy	0.80
Reproductive medicine	1.13	Environ studies, geog & dev	0.79
Philosophy	1.12	Radiol, nucl med & imaging	0.79
Computer sci & engineering	1.12	Archaeology	0.76
Education	1.11	Cell & developmental biol	0.64
Rehabilitation	1.11		

Source: Thomson Scientific

Table 11: Relative impact of research at non-G8 universities by narrow subject area 2001-2005

Narrow subject area	Relative impact	Narrow subject area	Relative impact
Geol/petrol/mining engn	2.00	Entomology/pest control	0.90
Agriculture/agronomy	1.66	Anesthesia & intensive care	0.90
Gastroenterol and Hepatology	1.65	Rehabilitation	0.90
Optics & acoustics	1.58	Sociology & social sciences	0.88
Space science	1.40	Microbiology	0.87
Instrumentation/measurement	1.31	Anthropology	0.86
Spectrosc/instrum/analyt sci	1.30	Medical res, diag & treatmt	0.86
Inorganic & nucl chemistry	1.27	Public hlth & hlth care sci	0.85
Ortho, rehab & sports med	1.26	Chemistry & analysis	0.84
Mathematics	1.20	Info technol & commun syst	0.84
Earth sciences	1.17	Physical chem/chemical phys	0.83
Pharmacology/toxicology	1.17	Physiology	0.83
Agricultural chemistry	1.16	Communication	0.82
Rheumatology	1.14	Pharmacology & toxicology	0.82
Food science/nutrition	1.13	Health care sci & services	0.82
Animal sciences	1.13	Organic chem/polymer sci	0.81
Veterinary med/animal health	1.12	Social work & social policy	0.81
Environmt med & public hlth	1.11	Oncology	0.80
Biology	1.10	Language & linguistics	0.80
Mechanical engineering	1.10	Elect & electronic engn	0.80
Neurology	1.09	Hematology	0.79
Aquatic sciences	1.09	Multidisciplinary	0.79
Otolaryngology	1.07	Chemical engineering	0.79
Pediatrics	1.07	Materials sci and engn	0.78
Experimental biology	1.07	Cardiovasc & hematology res	0.77
Education	1.07	Neurosciences & behavior	0.76
Philosophy	1.06	Oncogenesis & cancer res	0.76
History	1.05	Dentistry/oral surgery & med	0.75
Clin immunol & infect dis	1.04	Environmt engineering/energy	0.75
Cardiovasc & respirat syst	1.03	Endocrinol, metab & nutrit	0.74
Ophthalmology	1.03	Environ studies, geog & dev	0.73
Computer sci & engineering	1.03	Urology	0.71
Medical res, organs & syst	1.02	Biochemistry & biophysics	0.70
Appl phys/cond matt/mat sci	1.02	Medical res, general topics	0.70
Radiol, nucl med & imaging	1.00	Biotechnol & appl microbiol	0.70
Literature	1.00	Surgery	0.67
Environment/ecology	0.99	Psychiatry	0.66
General & internal medicine	0.99	Economics	0.66
Endocrinol, nutrit & metab	0.99	Library & information sci	0.66
Civil engineering	0.97	Clin psychology & psychiatry	0.63
Animal & plant sciences	0.96	Immunology	0.63
Engineering mgmt/general	0.94	Chemistry	0.61
Reproductive medicine	0.94	Resrch/lab med & med techn	0.59
AI, robotics & auto control	0.93	Political sci & public admin	0.57
Plant sciences	0.93	Molecular biology & genetics	0.56
Archaeology	0.93	Management	0.54
Engineering mathematics	0.92	Cell & developmental biol	0.41
Psychology	0.91	Performing arts	0.19
Physics	0.90		

Source: Thomson Scientific

Appendix B: Mapping of PBRF panels to Thomson Scientific subject areas

PBRF subject panels	Thomson Scientific subject fields
Biological sciences	Agriculture/agronomy Agricultural chemistry Animal & plant sciences Animal sciences Aquatic sciences Biochemistry & biophysics Biology Biotechnology & applied microbiology Cell & developmental biology Endocrinology, nutrition & metabolism Entomology/pest control Environment/ecology Experimental biology Food science/nutrition Immunology Microbiology Molecular biology & genetics Neurosciences & behaviour Physiology Plant sciences
Business and economics	Economics Management
Education	Education
Engineering, technology and architecture	Aerospace engineering AI, robotics & automatic control Art & architecture Civil engineering Electrical & electronics engineering Engineering management/general Engineering mathematics Environmental engineering & energy Instrumentation & measurement Mechanical engineering Nuclear engineering
Health	Dentistry/oral surgery & medicine Orthopaedics, rehabilitation & sports medicine Rehabilitation Veterinary medicine/animal health
Humanities and law	Classical studies History Language & linguistics Law Literature Philosophy Religion & theology

PBRF subject panels	Thomson Scientific subject fields
Mathematical and information sciences and technology	Computer science & engineering Information technology & communications systems Library & information sciences Mathematics
Medicine and public health	Anaesthesia & intensive care Cardiovascular & haematology research Cardiovascular & respiratory systems Clinical immunology & infectious disease Clinical psychology & psychiatry Dermatology Endocrinology, metabolism & nutrition Environmental medicine & public health Gastroenterology & hepatology General & internal medicine Health care sciences & services Hematology Medical research, diagnosis & treatment Medical research, general topics Medical research, organs & systems Neurology Oncogenesis & cancer research Oncology Ophthalmology Otolaryngology Paediatrics Pharmacology & toxicology Pharmacology/toxicology Psychiatry Public health & health care science Radiology, nuclear medicine & imaging Reproductive medicine Research/laboratory medicine & medical technology Rheumatology Surgery Urology
Physical sciences	Applied physics/condensed matter/materials science Chemical engineering Chemistry Chemistry & analysis Earth sciences Geological, petroleum & mining engineering Inorganic & nuclear chemistry Materials science & engineering Metallurgy Optics & acoustics Organic chemistry/polymer science Physical chemistry/chemical physics Physics Space science Spectroscopy/instrumentation/analytical sciences

PBRF subject panels	Thomson Scientific subject fields
Social sciences and other cultural/social studies	Anthropology Archaeology Communication Environmental studies, geography & development Political science & public administration Psychology Social work & social policy Sociology & social sciences

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