



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

What do international rankings tell us about the performance of New Zealand universities?



This report forms part of a series called Supporting the tertiary education system.

Author

Dr. Warren Smart, Senior Research Analyst
Email: warren.smart@minedu.govt.nz
Telephone: 04-463 8035

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What do international rankings tell us about the performance of New Zealand universities?

1	Introduction	2
2	International rankings	3
	2.1 How the rankings are determined	3
	2.2 Critiques of the rankings	5
3	Analysis of international rankings	7
	3.1 ARWU rankings	7
	3.2 THES rankings	18
4	Conclusion	25
5	References	26

FIGURES

1	Distribution of overall scores in the 2009 ARWU Top 500 rankings	8
2	Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings	10
3	Average relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings by component	11
4	Per capita relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings	12
5	Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings compared with the Australian G7 average score	13
6	Per capita relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings compared with the Australian G7 average per capita score	14
7	Ratio of the percentage of universities in the 2009 ARWU Top 500 per percentage share of total GDP by country	15
8	Ratio of the percentage of overall summed scores in the 2009 ARWU Top 500 per percentage share of total GDP by country	16
9	Ratio of country performance per share of population and GDP in the 2009 ARWU Top 500 by measure of performance	17
10	Distribution of overall scores in the 2009 THES Top 200 rankings	19
11	Overall relative score of New Zealand universities in the 2007-2009 THES Top 200 rankings	20
12	Average relative score of New Zealand universities in the 2007-2009 THES Top 200 rankings by component	21
13	Relative scores of the ranked New Zealand universities in the 2007-2009 THES Top 200 compared with the G7 average score	21
14	Ratio of the percentage of universities in the 2009 THES Top 200 per percentage share of total GDP by country	22
15	Ratio of the percentage of overall summed scores in the 2009 THES Top 200 per percentage share of total GDP by country	23
16	Ratio of country performance per share of population and GDP in the 2009 THES Top 200 by measure of performance	24

TABLES

1	Definitions of measures used in the 2009 Annual Ranking of World Universities (ARWU) Top 500 rankings	3
2	Definitions of measures used in the 2009 Times Higher Education Supplement (THES) Top 200 rankings	4
3	New Zealand universities' performance in the 2009 ARWU Top 500 rankings	7
4	Overall and per capita rankings of New Zealand universities in the 2009 ARWU Top 500 rankings	9
5	Overall rankings of New Zealand universities in the 2006-2009 ARWU Top 500 rankings	9
6	Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings	10
7	Average relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings by component	11
8	Per capita relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings	12
9	Rankings of New Zealand universities in the 2009 THES by component	18
10	Rankings of New Zealand universities in the THES 2007-2009	19
11	Overall relative scores of New Zealand universities in the THES Top 200 2007-2009	20

SUMMARY

This report analysed the data behind the Academic Rankings of World Universities (ARWU) Top 500 and Times Higher Education Supplement (THES) Top 200 university rankings to see what they can tell us about the performance of New Zealand universities. Given that many international students are likely to consult league tables when deciding where to study, assessing the message these rankings send is important. The analysis showed that:

- The ARWU Top 500 rankings understate the level of performance by New Zealand universities. Once size of university or the size of the economy is taken into account, New Zealand universities perform at a higher level than indicated by the overall rankings.
- Between 2005 and 2009, New Zealand universities have rated lower than the top Australian universities but have generally maintained their level of performance relative to those top Australian universities in the ARWU Top 500 rankings.
- Even though New Zealand universities are ranked higher in the THES Top 200, methodological weaknesses in the THES approach means there is less value in these rankings. From 2010, the THES rankings will be presented using a revised methodology.
- Rather than a focus on position in the rankings, it may be more appropriate to compare the relative performance of New Zealand universities to the top-performing world university. Alternatively, benchmarking of New Zealand universities against the performance of Australian universities may be more relevant.

1 INTRODUCTION

Each year, the release of the Times Higher Education Supplement (THES) Top 200 and the Academic Ranking of World Universities (ARWU) Top 500 university rankings generates significant interest around the world. New Zealand is no exception, with headlines such as “Auckland moves up world uni ranking”, “Five NZ unis make global Top 500”, “Waikato scrambles up world ranking” and “Massey drops, NZ steady in Shanghai rankings” appearing in the media following the release of the 2009 THES and ARWU rankings.¹

As well as generating media interest, it appears that international university ranking systems have achieved some degree of public and policy credibility in a number of countries (Marginson 2007). This is due, in part, to the impact of rankings on the choice of destination of international students, an important source of revenue for higher education institutions. Research suggests that international students are among those most likely to look at league tables when making their decision about where to study (HEFCE 2008).

Although the results of international rankings do not directly influence the government’s tertiary education policy in New Zealand, international students are an important source of revenue for New Zealand universities. In 2008, around 9 percent of New Zealand university income was sourced from international student fees. So it is worthwhile examining international rankings systems to see what they actually tell us about the performance of New Zealand universities.²

This report analyses the underlying data used to compile two of the best known ranking systems, the ARWU and THES.³ In particular, this report examines the individual components used to compile the overall rankings to see where the relative strengths and weakness of New Zealand universities’ performance are. This report also considers how the results should be interpreted.

The structure of this report is as follows: first, the methods used to generate the THES and ARWU rankings are presented; then, criticisms of the rankings are summarised; this is followed by an analysis of the New Zealand universities’ performance in the rankings; finally, some conclusions are presented.

¹ See *New Zealand Herald* 9/10/2009, *Stuff* website 12/11/2009 and *New Zealand Education Review* 16/10/2009 & 20/11/2009, respectively.

² Arguably, domestic students in New Zealand are more likely to take notice of the results of the Performance-Based Research Fund (PBRF) Quality Evaluation than that of international ranking systems.

³ Other examples include the Centre for Higher Education Development rankings (see www.che-ranking.de/cms/?getObject=614&getLang=en) and the Eduniversal rankings of business schools (see www.eduniversal.com/business-school-ranking/country/new-zealand/163). For a good summary of many of the rankings systems see Usher and Savino (2006).

2 INTERNATIONAL RANKINGS

2.1 How the rankings are determined

ARWU ranking

The first ARWU rankings were published in 2003 and were developed initially as a benchmarking exercise for the Shanghai Jiao Tong University. In its current configuration, the 2009 ARWU rankings use six measures of performance to generate an overall ranking for each university. These measures are defined in Table 1.

There are two key points to note about the measures used in the ARWU rankings. First, the ARWU indicators measure the research performance of a university, with no indicators of teaching performance. Second, five of the six measures are *totals* of either people or research outputs. Only one indicator is calculated on a per academic staff member basis. This means that the ARWU is, to a certain extent, a measure of *volume* of research, with larger institutions at an advantage. How this impacts on the rankings of the New Zealand universities is explored later in this report.

Table 1

Definitions of measures used in the 2009 Academic Ranking of World Universities (ARWU) Top 500 rankings

Measure	Weight	Definition
Alumni	10%	The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelors, masters or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees after 1991, 90% for alumni obtaining degrees in 1981-1990, 80% for alumni obtaining degrees in 1971-1980, and so on, and finally 10% for alumni obtaining degrees in 1901-1910. If a person obtains more than one degree from an institution, the institution is considered once only.
Award	20%	The total number of the staff of an institution winning Nobel Prizes in Physics, Chemistry, Medicine and Economics and Field Medals in Mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners after 2001, 90% for winners in 1991-2000, 80% for winners in 1981-1990, 70% for winners in 1971-1980, and so on, and finally 10% for winners in 1911-1920. If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions. For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize.
HiCite	20%	The number of highly cited researchers in 21 subject categories. These individuals are the most highly cited within each category. The definition of categories and detailed procedures can be found at the website of Thomson Reuters.
Nature & Science (N&S)	20%	The number of papers published in the journals Nature and Science between 2004 and 2008. To distinguish the order of author affiliation, a weight of 100% is assigned for corresponding author affiliation, 50% for first author affiliation (second author affiliation if the first author affiliation is the same as corresponding author affiliation), 25% for the next author affiliation, and 10% for other author affiliations. Only publications of 'Article' and 'Proceedings Paper' types are considered
Publications (PUB)	20%	Total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in 2008. Only publications of 'Article' and 'Proceedings Paper' types are considered. When calculating the total number of papers of an institution, a special weight of two was introduced for papers indexed in Social Science Citation Index.
Per capita	10%	The weighted scores of the above five indicators divided by the number of full-time equivalent academic staff. If the number of academic staff for institutions of a country cannot be obtained, the weighted scores of the above five indicators is used.
Overall	100%	

Source: www.arwu.org

To generate a final ranking, the performance of each university in each measure is expressed as a percentage of the top-performing university. Then, the weightings shown in Table 1 are applied to these relative measures and a total score calculated. To obtain the final ranking, each university score is then expressed as a percentage of the score achieved by the top university. For example, a score of 80 means that the overall weighted performance of that university was 80 percent that of the top performing university.

THES ranking

The first THES rankings were published in 2004 and were designed to inform readers of the THES about the comparable performance of the world's universities through measuring a number of dimensions of university performance. Up to and including 2009, the THES rankings were compiled by QS Quacquarelli Symonds Ltd.

The measures used to compile the 2009 THES rankings include: survey results from academics and employers that captures the perceptions of the quality of a university, measures of class size, research impact and the proportions of international faculty and students at an institution (see Table 2). A key point to note is that the THES is heavily reliant on surveys about the perceived quality of universities, with the academic and employer survey contributing 50 percent of the weighted performance score.

Table 2

Definitions of measures used in the 2009 Times Higher Education Supplement (THES) Top 200 rankings

Measure	Weight	Definition
Academic Peer Review (Acad PR)	40%	Composite score drawn from peer review survey (which is divided into five subject areas). There were 9,386 responses in 2009 (6,354 in 2008).
Employer Peer Review (Emp PR)	10%	Score based on responses to employer survey. There were 3,281 responses in 2009 (2,339 in 2008).
Faculty Student Ratio (EFTS/FTE)	20%	Score based on student faculty ratio. A lower number of students to staff is treated as representing higher quality of teaching.
Citations per Faculty member (Cites/FTE)	20%	Score based on research performance factored against the size of the research body. The citations are sourced from the bibliometric database SCOPUS and represent the total for the last five years.
International Faculty (Int faculty)	5%	This measure captures international reputation and is measured by the proportion of international faculty at a university. A higher proportion is treated as representing better performance.
International Students (Int students)	5%	This measure captures international reputation and is measured by the proportion of international students at a university. A higher proportion is treated as representing better performance.
Overall	100%	

Source: www.topuniversities.com

From 2007, the THES rankings have been calculated in a way that reduces the dispersion in performance in the various measures, reducing the impact of outliers. This process involves the use of z scores⁴ to calculate the relative performance of universities compared to the top performing university. The weightings in Table 2 are then applied to the score in each measure to arrive at a relative score, which is then expressed as a percentage of the top performing university. This overall score is then used to determine the rankings.

⁴ A z score indicates how many standard deviations an observation is above or below the mean value.

2.2 Critiques of the rankings

Both the ARWU and THES rankings have come in for criticism. A key criticism of both ranking systems is that they both aggregate the component scores to create a final overall ranking. This aggregation is regarded as flawed (Brooks 2005). It is argued that universities may have different areas of specialisation, so a better way of applying rankings is to compare each university against other universities on each specialisation. Also, the generation of a final ranking measure requires the use of arbitrary weightings, the selection of which introduces subjectivity into the rankings process (Usher and Savino 2006). In this regard, Usher and Savino praise the approach of the Centre for Higher Education Development rankings which does not seek to arrive at a final single ranking.

Another criticism is that higher education institutions based in English-speaking countries have an advantage, given that the bibliometric measures used in both the THES and ARWU are sourced mainly from English-speaking journals (Marginson 2007). In the case of the THES rankings, the citation data used to measure research performance is not normalised for different subject disciplines. There are vastly different rates of citation across subject disciplines, so universities with a focus on science and/or the presence of a medical school will fare better in this measure.⁵

Additional criticisms that apply to each of the individual rankings are examined below.

THES rankings

Marginson (2007) argues that the large weighting applied to survey responses (50 percent) captures how a university is perceived, not how they actually perform. The result is that universities are being judged on credentialism and not actual learning and research outcomes. In addition, he argues that there is a lack of transparency in these measures and a problem with regional bias. Marginson argues that universities in the UK and USA will have better name recognition. This is compounded by a low response rate (around 1 percent) for the academic peer review measure.

Marginson has also criticised the use of the number of students to academic staff as a proxy for teaching quality, with a lower ratio supposedly reflecting higher quality. Marginson argues that teaching quality cannot be accurately assessed using a resource quantity indicator such as this.

Although the ranking authors suggest that the proportion of international students reflects the prestige with which an institution is viewed, Marginson argues it simply rewards volume building. This measure will also favour universities in English speaking countries and those in countries where there is a centrally mandated export education policy.

The THES rankings are being substantially revised for 2010, and a new analytical contractor has been appointed by THES. The THES rankings will reappear in a quite different form from 2010.⁶

ARWU rankings

As mentioned previously, the ARWU rankings focus solely on research-based measures. Therefore, this ranking system does not present a picture of university performance across multiple dimensions. Also, institutions of larger size will be at an advantage as four of the five measures (comprising 90 percent of the final score) use totals of researchers or research outputs in calculating relative performance.

⁵ The authors of the ARWU ranking have responded to criticism of the bias of bibliometric databases by applying a weighting of 2 to papers published in the social sciences index.

⁶ See <http://www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=408980>.

Of the specific measures used in the ARWU rankings, the inclusion of Nobel prize winners is controversial as it is largely science-based and can be subject to politicking (Marginson 2007). It also means that institutions earn points from people who may have long since ceased to be associated with that institution through a halo effect. This historic nature also applies to the HiCite measure, which examines citations of individuals between 1981 and 1999 (Holmes 2006).

Conclusion

It is clear that neither the ARWU nor the THES rankings are free from criticism. Nevertheless, a number of analyses of the THES and ARWU rankings argue that the ARWU rankings are a better indicator of institutional excellence (see Taylor and Braddock 2007; Marginson 2007). However, it should be remembered that the ARWU focuses solely on research performance and does not provide any information on the teaching activities of institutions. Therefore, a good understanding of the coverage and limitations of these systems is crucial to interpreting institutional performance.

3 ANALYSIS OF INTERNATIONAL RANKINGS

3.1 ARWU rankings⁷

Table 3 presents the New Zealand universities' performance in the 2009 ARWU rankings. The first seven columns represent a relative score out of 100, with 100 representing the performance by the top university in that measure. The final column is the overall ranking of the university. Note that the individual rankings for institutions outside the top 100 are not published. Instead, universities are placed in broad ranges of rankings in alphabetical order. The actual ranking of the New Zealand universities which are all outside the top 100 has been determined by the author from the underlying data.

The University of Auckland achieved the highest ranking (214), followed by the University of Otago (279) and the University of Canterbury (422).⁸ The world's top ranked university was Harvard University from the United States.

Table 3

New Zealand universities' performance in the 2009 ARWU Top 500 rankings

University	Alumni (10%)	Awards (20%)	HiCite (20%)	N&S (20%)	PUB (20%)	Per capita (10%)	Overall score	Rank
Auckland	15.5	0	10.3	14.6	35.8	18.4	15.9	214
Otago	0	0	10.3	9.7	33.8	24.6	13.6	279
Canterbury	0	0	7.3	7.5	25.0	18.3	10.0	422
Massey	0	0	10.3	2.6	27.1	15.1	9.8	431
Victoria	13.4	0	0	9.0	20.6	15.4	9.0	482
NZ mean	5.8	0	7.6	8.7	28.5	18.4	11.7	366
Overall mean	8.6	6.9	15.6	14.9	37.2	21.3	18.4	

Note: 1. The scores are relative to the top-placed university, which has a score of 100. The top-performing university overall was Harvard. The ARWU does not publish the individual rankings of universities that are outside of the top 100. The rankings for these universities are reported in blocks with the universities ranked in alphabetical order. As all of the New Zealand universities are ranked outside of the top 100, the methodology used to determine the rankings in the ARWU has been applied by the Ministry of Education to the published raw data to generate the derived rankings for the New Zealand universities. The raw data is available at www.arwu.org. 2. This table has been revised.

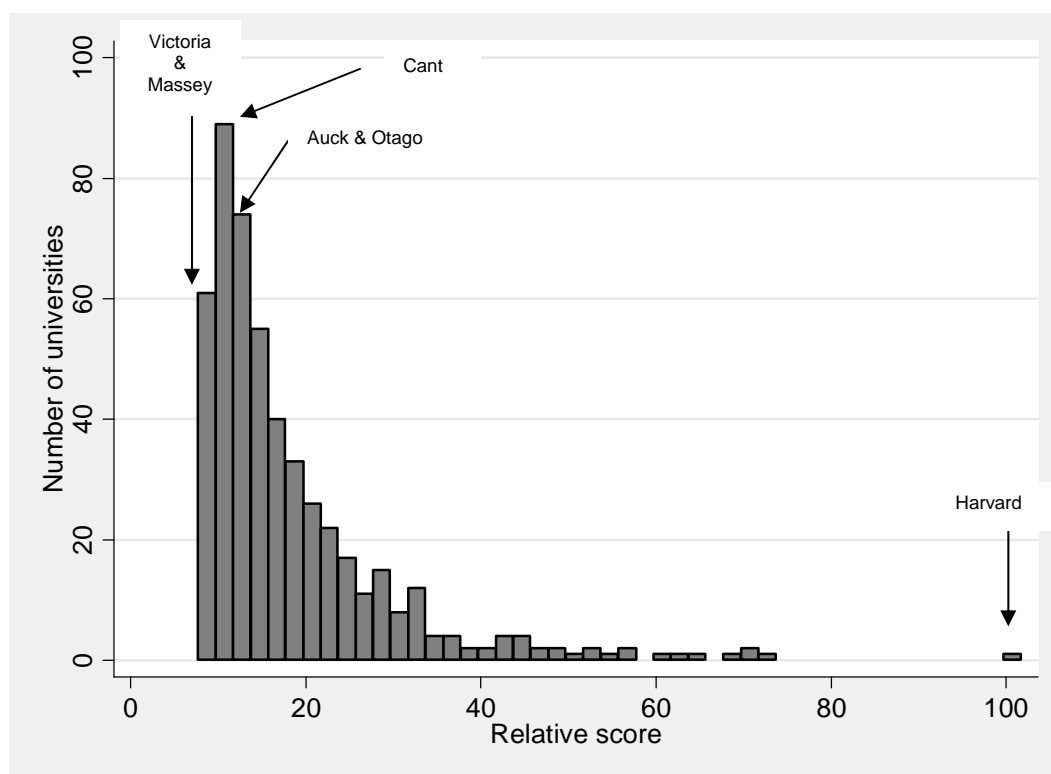
The overall score used to determine the rankings indicates that the performance of the top ranked New Zealand university, Auckland, was 15.9 percent that of Harvard University. To put this in perspective, the distribution of the overall scores of the Top 500 universities in 2009 are presented in Figure 1 with the location of the New Zealand universities marked on the graph. It is clear that the majority of universities in the Top 500 (including the five New Zealand universities) are located towards the lower end of overall relative scores. Harvard, the top performing university, is well ahead of the second placed university, Stanford.

Therefore, although the relative score of the New Zealand universities is well below that of the top-placed university, they are much closer to the relative performance of the majority of universities in the Top 500 than is indicated by raw relative overall scores.

⁷ There are some inconsistencies in the results for 2008 currently published on the ARWU website and what was released at the time the rankings were published. For this study, the original 2008 results are the ones used.

⁸ The University of Waikato, Lincoln University and Auckland University of Technology do not appear in the ARWU rankings.

Figure 1
Distribution of overall scores in the 2009 ARWU Top 500 rankings



The relative scores for each individual component of the rankings can identify areas where the New Zealand universities perform relatively well and not so well. The data in Table 3 shows that the strongest area of relative performance is in the number of indexed publications. The average relative score in this measure is 28.5, which compares with the overall average of 37.2 for the Top 500 universities. The weakest relative performance is in the area of awards to faculty. No current staff member of a New Zealand university has been awarded a Nobel or Field prize.

One of the individual component scores, per capita performance, can be used to show the impact the size of a university can have on the ARWU rankings. This measure adjusts the other five measures by the number of academic staff at a university and presents a figure more in line with traditional reporting standards used in New Zealand and a more conventional performance indicator. For example, the Performance-Based Research Fund (PBRF) Quality Evaluation results are presented on a per full-time equivalent staff basis, not a total score basis.

Table 4 compares the rankings of the five New Zealand universities in the Top 500 in 2009 using the overall measure and the per capita measure. On average, there is an improvement of 80 places for the New Zealand universities if the per capita measure is used to rank institutions, with the University of Otago now the top-ranked New Zealand university and the University of Auckland now in second place.⁹ The biggest movement is by the University of Canterbury, which improves 154 places. Only the University of Auckland exhibits a decrease in ranking, with a fall of 49 places. So taking into account the number of academic staff at a university presents a quite different picture of the performance of New Zealand universities.

⁹ The results in Table 4 also mirror the 2006 PBRF Quality Evaluation results, in that, the University of Otago ranked number one on a full-time equivalent staff member basis while the University of Auckland received the highest number of total points.

Table 4

Overall and per capita rankings of New Zealand universities in the 2009 ARWU Top 500 rankings

University	Overall	Per capita	Change in ranking
Auckland	214 (1)	263 (2)	↓ 49
Otago	279 (2)	131 (1)	↑ 148
Canterbury	422 (3)	268 (3)	↑ 154
Massey	431 (4)	387 (5)	↑ 44
Victoria	482 (5)	379 (4)	↑ 103
Mean	366	286	↑ 80

Note: 1. The figure in brackets is the ranking of the individual university among the ranked New Zealand universities. . The ARWU does not publish the individual overall rankings of universities that are outside of the top 100. The rankings for these universities are reported in blocks with the universities ranked in alphabetical order. As all of the New Zealand universities are ranked outside of the top 100, the methodology used to determine the rankings in the ARWU has been applied by the Ministry of Education to the published raw data to generate the derived rankings for the New Zealand universities. The raw data is available at www.arwu.org. To generate the Per capita rankings, the universities in the ARWU top 500 have been ranked from highest to lowest based on their 'per capita' score. The 'per capita' score for each university can be found at www.arwu.org. 2. This table has been revised.

The ranking data for 2009 provides an up-to-date snapshot of university performance, but does not show how New Zealand university performance has been changing over time. Often, the focus when the rankings are released is on how the ranking of an individual university has changed from one year to the next. Table 5 presents the ranking of the New Zealand universities within the Top 500 between 2006 and 2009.¹⁰ We can see that the rankings of the New Zealand universities have remained relatively stable over this time, which is not surprising, as it is unlikely that major change in performance would occur within a short space of time.

The biggest change in ranking occurred at the University of Canterbury, which improved 26 places. Of the other universities, Auckland (2 places), Massey (26 places), Victoria (14 places) and Otago (9 places) showed a deterioration in their ranking.¹¹

Table 5

Overall rankings of New Zealand universities in the 2006-2009 ARWU Top 500 rankings

University	2006	2007	2008	2009	Change in ranking 2006-2009
Auckland	216 (1)	210 (1)	202 (1)	214 (1)	↓ 2
Otago	270 (2)	308 (2)	281 (2)	279 (2)	↓ 9
Canterbury	448 (4)	441 (4)	453 (4)	422 (3)	↑ 26
Massey	405 (3)	385 (3)	393 (3)	431 (4)	↓ 26
Victoria	468 (5)	441 (4)	468 (5)	482 (5)	↓ 14

Note: 1. The figure in brackets is the ranking of the individual university among the ranked New Zealand universities. The ARWU does not publish the individual rankings of universities that are outside of the top 100. The rankings for these universities are reported in blocks with the universities ranked in alphabetical order. As all of the New Zealand universities are ranked outside of the top 100, the methodology used to determine the rankings in the ARWU has been applied by the Ministry of Education to the published raw data to generate the derived rankings for the New Zealand universities. The raw data is available at www.arwu.org. 2. This table has been revised.

But the rankings in Table 5 don't tell the whole story. If closing the gap to the top-performing university is the objective, then arguably, the overall relative score should be the focus of attention, rather than the rankings themselves. Table 6 presents the overall relative score for participating New Zealand universities between 2006 and 2009, while Figure 2 graphs the same data.

¹⁰ Although rankings data is available for earlier years, there appear to be inconsistencies in the New Zealand university data.

¹¹ The larger change in places among lower-ranked universities reflects the greater bunching of institutions that occurs at the lower end, meaning it is more likely that lower ranked institutions will change ranking.

Table 6

Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings

University	2006	2007	2008	2009	% change 2006-2009
Auckland	16.1	16.1	16.7	15.9	-1.1%
Otago	14.0	12.8	13.6	13.6	-3.0%
Canterbury	9.3	9.4	9.5	10.0	8.0%
Massey	10.1	10.4	10.6	9.8	-3.3%
Victoria	9.0	9.4	9.3	9.0	-0.1%

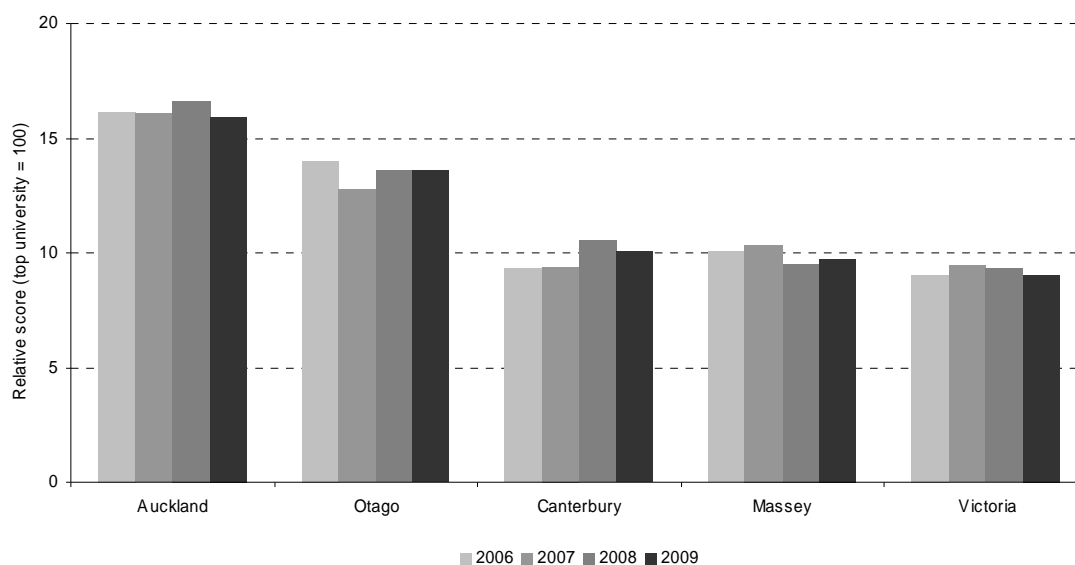
Source: www.arwu.org

With the focus now on performance relative to the top university, the data shows that over time the University of Canterbury has been improving its performance compared to the top university (Harvard). Victoria University of Wellington had a similar score in 2009 to that it achieved in 2006, while the other three universities all had lower overall scores in 2009, compared with 2006. Generally, the size of the change in relative performance by New Zealand universities was relatively modest, once again reflecting the difficulty in achieving significant change within a short time-span.

The analysis of overall scores can also show how the ranking of a university may improve while its performance relative to the top university may decline. For example, the University of Auckland achieved a ranking of 216 with a score of 16.1 in 2006, but was ranked higher in 2009 at 214 with a lower overall score of 15.9. In other words, the relative performance of the University of Auckland compared with Harvard University fell, but not as much as some of the universities that were previously ranked higher than Auckland. Depending on what is the focus of measurement, one could justly claim that Auckland's performance either improved or deteriorated over the period.

Figure 2

Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings



Comparing the overall score and ranking can also show that it is easier for universities with lower overall scores to move up and down the rankings. For example, Massey University and the University of Auckland saw their overall relative score decrease by a similar amount between 2008 and 2009 (0.9 points for Auckland and 0.8 points for Massey), but Auckland's ranking deteriorated by 12 places only while Massey's deteriorated by 38 places.

To show the key drivers of change in the rankings over time, Table 7 presents the average component scores for the five New Zealand universities in the Top 500 between 2006 and 2009. This data is graphed in Figure 3.

The data shows that the relative scores of the number of indexed publications, highly cited researchers and per capita performance of the New Zealand universities improved on average between 2006 and 2009. However, this has been offset by a decline in the Alumni score and Nature & Science (N&S) score over this time.

Table 7

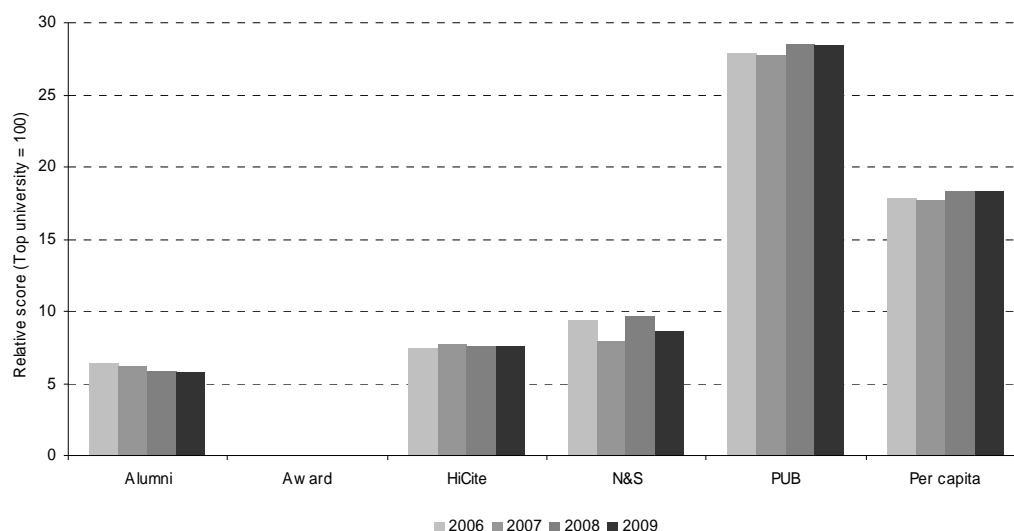
Average relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings by component

Component	2006	2007	2008	2009	% change 2006-2009
Alumni	6.4	6.2	5.9	5.8	-9.4%
Award	0.0	0.0	0.0	0.0	0.0%
HiCite	7.4	7.8	7.6	7.6	2.7%
N&S	9.4	7.9	9.7	8.7	-7.9%
PUB	28.0	27.7	28.6	28.5	1.7%
Per capita	17.9	17.7	18.3	18.4	2.7%

Source: www.arwu.org

Figure 3

Average relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings by component



Another way of comparing performance to that of the top-placed university is to examine the trends in per capita score over time. The relative overall per capita score is presented in Table 8 and graphed in Figure 4. The biggest improvement in the relative per capita score between 2006 and 2009 was achieved by the University of Canterbury (8.3 percent), while the smallest increase was shown by the University of Otago (0.4 percent).¹²

What becomes clearer, once you take size of institution into account, is that the relative performance of *all* New Zealand universities has improved between 2006 and 2009, compared with the top-placed university (California Institute of Technology - Caltech). This compares with the results in Table 6, where just *one* of the New Zealand universities exhibited an improvement in relative overall score over the same period.

The impact of size on performance can also be illustrated by a hypothetical merger of the five New Zealand universities in the 2009 ARWU rankings. Without any change in individual university performance, this action would result in a single university being ranked around 14th in the world.

Table 8

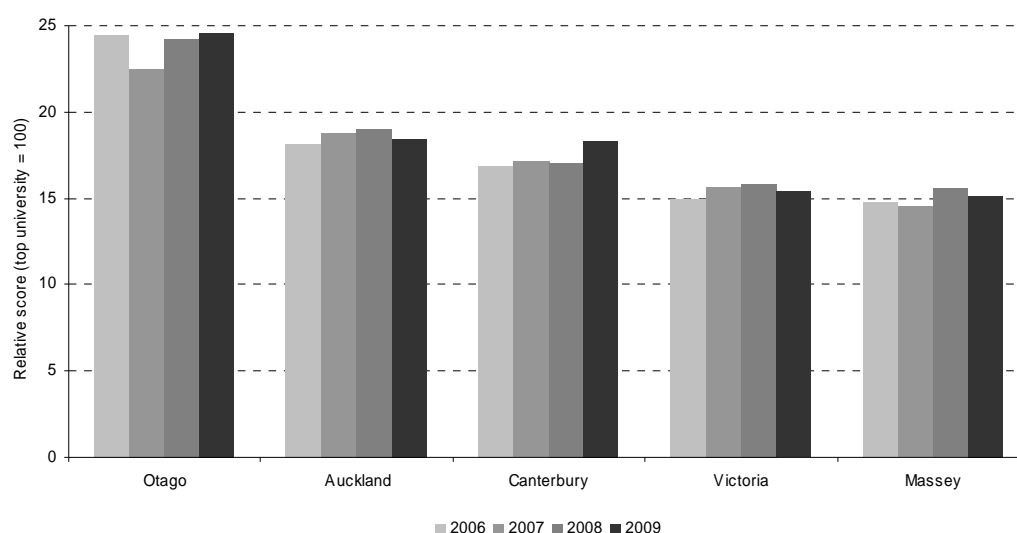
Per capita relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings

University	2006	2007	2008	2009	% change 2006-2009
Auckland	18.2	18.8	19.0	18.4	1.1%
Otago	24.5	22.5	24.2	24.6	0.4%
Canterbury	16.9	17.1	17.0	18.3	8.3%
Massey	14.8	14.5	15.6	15.1	2.0%
Victoria	15.0	15.7	15.8	15.4	2.7%

Source: www.arwu.org

Figure 4

Per capita relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings



¹² The performance of the University of Otago may have been affected by the merger with the Dunedin College of Education in 2007, which would have potentially increased the number of academic staff without boosting the research performance of the university. The University of Canterbury also merged with a college of education (Christchurch College of Education) in 2007, but it does not appear to have had the same level of impact on Canterbury's per capita performance.

The question of what benchmark New Zealand universities should be measured against deserves further discussion. Whether it is prudent to benchmark to Harvard's or Caltech's performance is moot, given the massive resources at the disposal of these American universities. Arguably, a better benchmark might be against the Australian universities, in particular the Group of Eight (G8).¹³

The G8 comprises eight large metropolitan universities that are research intensive in nature and are commonly the subject of benchmarking for New Zealand universities.¹⁴ For the purposes of this analysis, one of the G8 universities, Australian National University (ANU), is excluded from the analysis. ANU is predominantly focused on postgraduate-level teaching and research, so comparing the performance of ANU with New Zealand universities is arguably not appropriate. This leaves the other seven universities in the group – called the 'G7' – as the benchmark.

Figure 5 presents the overall scores of the New Zealand universities, relative to the Australian G7 average overall score between 2006 and 2009. The University of Auckland is closest to the G7 average in terms of performance with an overall relative score of 76 in 2009, followed by the University of Otago (64). The other three universities in Figure 5 display relatively similar performance at just under half the G7 average in 2009.

Although the period between 2006 and 2009 is relatively short, the data in Figure 5 suggests that the University of Auckland, University of Otago, Massey University and Victoria University of Wellington have been losing ground to the G7 universities, while the University of Canterbury exhibited improved relative performance.

Figure 5

Overall relative scores of New Zealand universities in the 2006-2009 ARWU Top 500 rankings compared with the Australian G7 average score

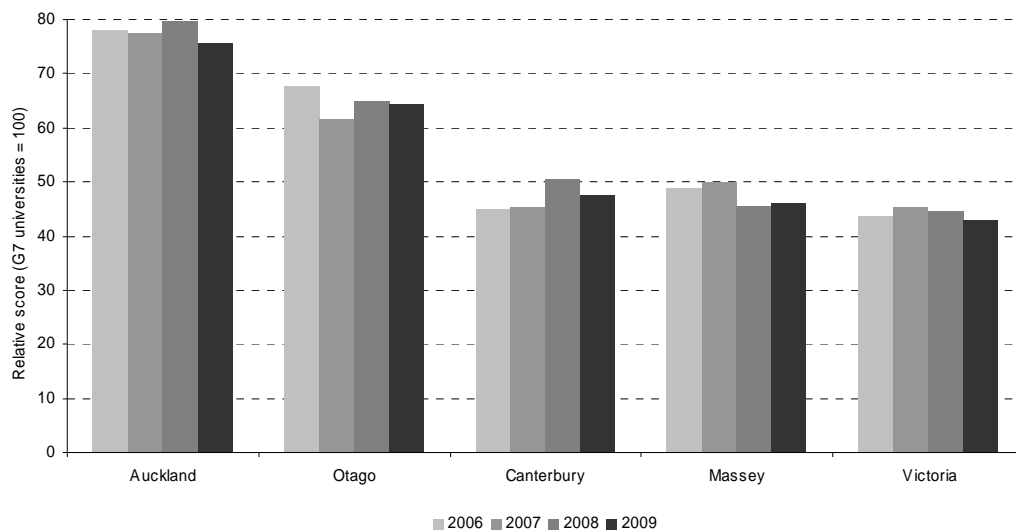


Figure 6 compares the relative performance of New Zealand universities with the G7 using the per capita measure. Once again, by adjusting for the size of the academic workforce the relative performance of New Zealand universities improves. In 2009, the University of Otago shows a per capita relative score (98) around the G7 average. Although the relative performance of the

¹³ The members of the G8 are the University of Sydney, University of New South Wales, University of Melbourne, University of Western Australia, University of Adelaide, Monash University, University of Queensland and the Australian National University.

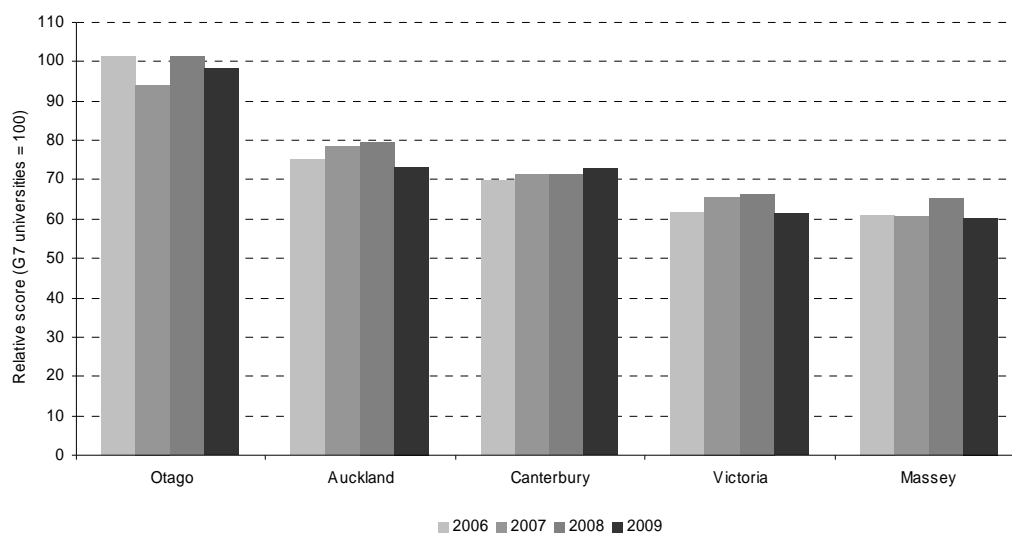
¹⁴ For example, Smart (2009).

University of Auckland declines slightly when using the per capita measure, the remaining three universities in Figure 6 all improve their performance to the G7 average.

Between 2006 and 2009, the University of Canterbury once again shows an improvement in performance relative to the G7 average using per capita relative score. Victoria University of Wellington improved each year until exhibiting a drop in relative performance in 2009, as did the University of Auckland. The per capita data for the University of Otago fluctuates over time, while Massey University exhibited a similar relative score in 2009 as it achieved in 2006. Overall, when you take account of institutional size the data would suggest that New Zealand universities are, on average, maintaining their relative position with the G7 universities.

Figure 6

Per capita relative score of New Zealand universities in the 2006-2009 ARWU Top 500 rankings compared with the Australian G7 average per capita score

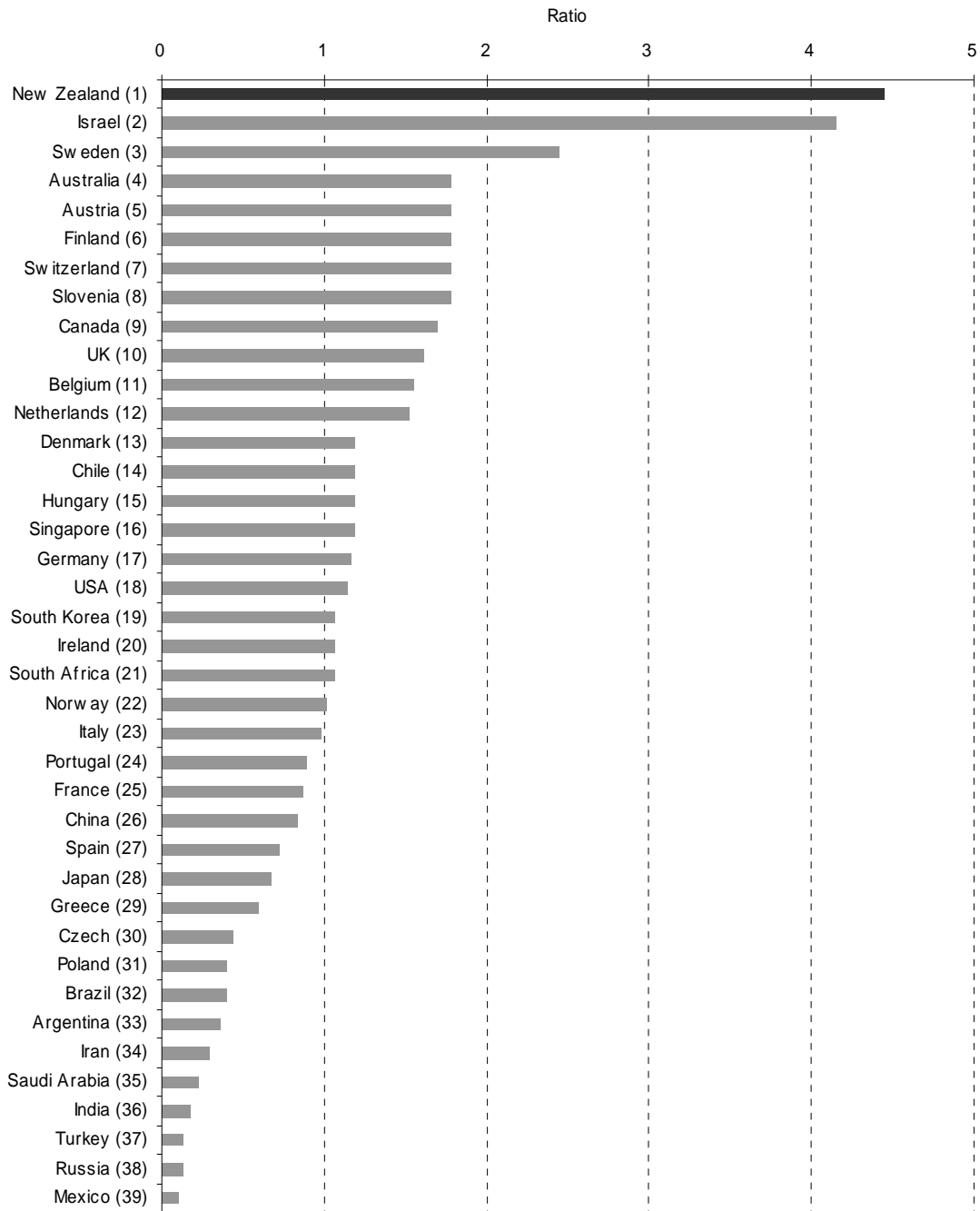


The ARWU rankings also consider information on the gross domestic product (GDP) and population of countries in the Top 500. They use this to measure country performance by comparing measures such as the share of Top 500 universities with the share of world GDP. This can help to adjust the results for the fact that more wealthy nations can support their higher education systems to a greater degree through either greater government funding or private endowments. Figure 7 shows the ratio of the percentage share of universities in the Top 500 per percentage share of the total GDP for each of the countries with universities in the Top 500.

New Zealand is the top-performing country in terms of this ratio – our share of Top 500 universities was over 4 times New Zealand’s share of total GDP. So once the size of an economy is taken into account, the New Zealand universities perform very well in the ARWU.

Figure 7

Ratio of the percentage of universities in the 2009 ARWU Top 500 per percentage share of total GDP by country

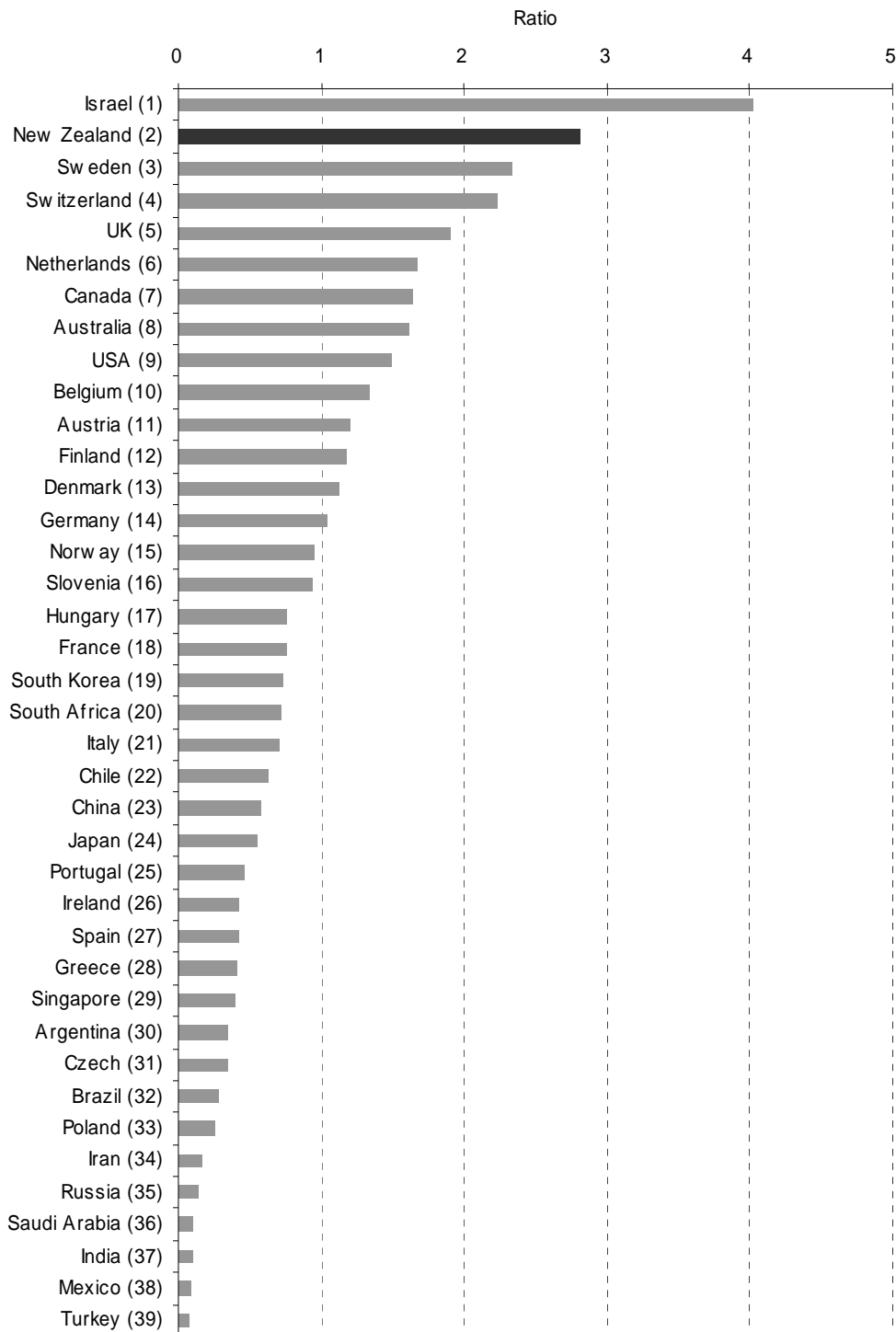


However, there is still an issue with relative performance. For example, a country could have 10 universities in the Top 500, but this would say nothing about their relative position. They could be ranked between 491 and 500. To control for this, we sum the points used to determine the overall ranking at the country level and compare it to that country's share of total GDP.

Figure 8 presents this data. Once the relative position of New Zealand's universities is taken into account, we slip from number 1 to number 2 in the rankings, reflecting the fact that none of our universities are in the 'top tier' in the raw rankings. Nevertheless, this still represents strong performance by the country's universities.

Figure 8

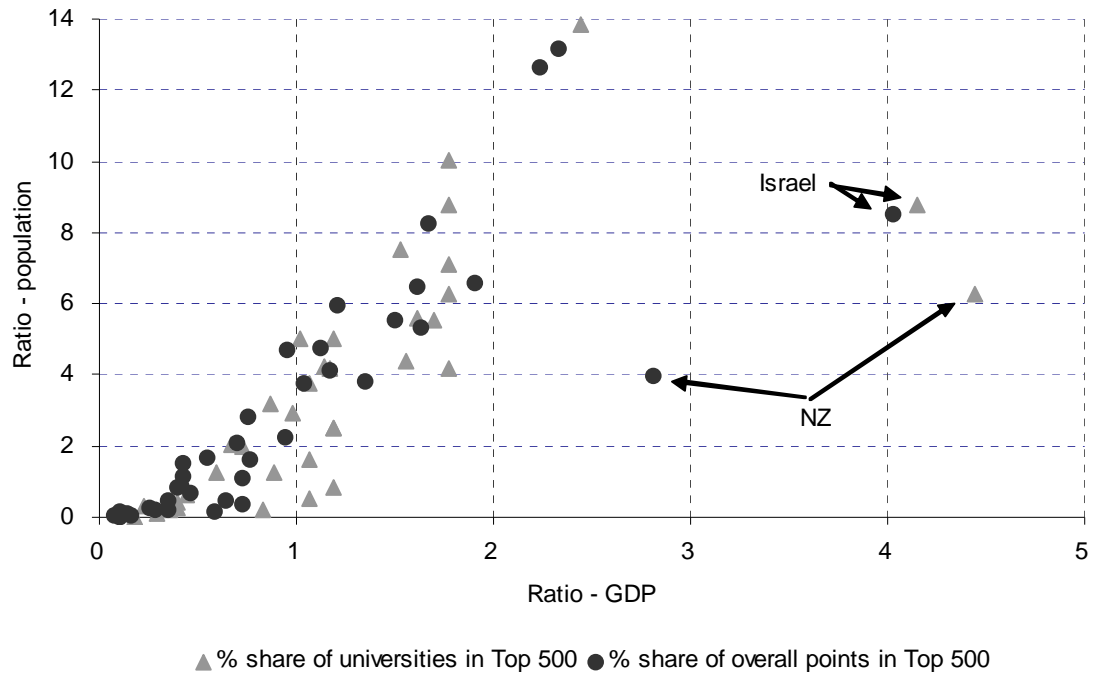
Ratio of the percentage of overall summed scores in the 2009 ARWU Top 500 per percentage share of total GDP by country



Although New Zealand performs well when adjusting for the size of the economy, a somewhat different picture emerges if performance is adjusted for the size of the population. Figure 9 compares country performance in the ARWU Top 500 when adjusted by share of GDP with country performance adjusted by share of population.

Figure 9

Ratio of country performance per share of population and GDP in the 2009 ARWU Top 500 by measure of performance



Broadly, the results show a reasonable degree of correlation between country performance adjusted for share of GDP and country performance adjusted for share of population. However, New Zealand, along with Israel, appear to be significant outliers compared to the other countries in the Top 500. Although both countries perform very well in the GDP adjusted measure, they are lower performers when taking into account population size. For example, in the share of universities in the Top 500 metric, New Zealand is ranked first on the GDP adjusted measure (with a ratio of 4.4) but ranked just eighth on the population adjusted measure (with a ratio of 6.3).

3.2 THES rankings¹⁵

The results of the 2009 THES rankings are presented in Table 9. The top New Zealand university in terms of overall rankings is Auckland (61) followed by Otago (125) and Canterbury (188).¹⁶ The top university overall, as was the case in the ARWU rankings, is Harvard University.

It is clear from these results that the ranked New Zealand universities perform better in the THES than in the ARWU rankings. But, what is the source of this better performance? The University of Auckland's top ranking is based on strong performance in the academic and employer peer review measure. Not surprisingly, given its per capita performance in the ARWU rankings, the University of Otago is the top-ranked New Zealand university in terms of the research measure, cites/FTE. It also performs particularly strongly in terms of international faculty, as do all of the New Zealand universities. Ranked New Zealand universities do less well in the number of students per academic staff member.

As noted earlier, the THES rankings are biased in favour of English-speaking countries, especially those countries that promote export education. Alongside the concerns raised about the survey methods used by THES, this means that the performance of New Zealand universities in these measures should be viewed with caution.

Table 9
Rankings of New Zealand universities in the 2009 THES by component

University	Acad PR (40%)	Emp PR (10%)	EFTS/FTE (20%)	Cites/FTE (20%)	Int faculty (5%)	Int students (5%)	Overall
Auckland	38 (1)	40 (1)	366 (4)	275 (2)	52 (6)	22 (1)	61 (1)
Otago	130 (2)	127 (3)	333 (2)	222 (1)	5 (1)	95 (3)	125 (2)
Canterbury	185 (3)	69 (2)	459 (6)	335 (3)	19 (3)	99 (4)	188 (3)
Victoria	229 (4)	124 (4)	436 (5)	450 (5)	15 (2)	100 (5)	229 (4)
Massey	300 (5)	278 (6)	330 (1)	425 (4)	44 (4)	192 (6)	299 (5)
Waikato	344 (6)	264 (5)	347 (3)	459 (6)	45 (5)	55 (2)	314 (6)

Note: The figure in brackets is the ranking of the individual university among the ranked New Zealand universities.

Source: QS Quacquarelli Symonds (www.topuniversities.com).

The relative performance of the three New Zealand universities in the THES Top 200 is shown in Figure 10, which shows the distribution of the Top 200 universities by the overall relative score. One notable feature is that the distribution is less skewed than the ARWU, which reflects the approach of THES in using z scores to calculate relative scores, reducing dispersion.

¹⁵ Note that due to changes in methodology, the analysis of performance of New Zealand universities in the THES Top 200 covers the period 2007 to 2009.

¹⁶ Lincoln University and the Auckland University of Technology do not appear in the THES Top 200 rankings.

Figure 10
Distribution of overall scores in the 2009 THES Top 200 rankings

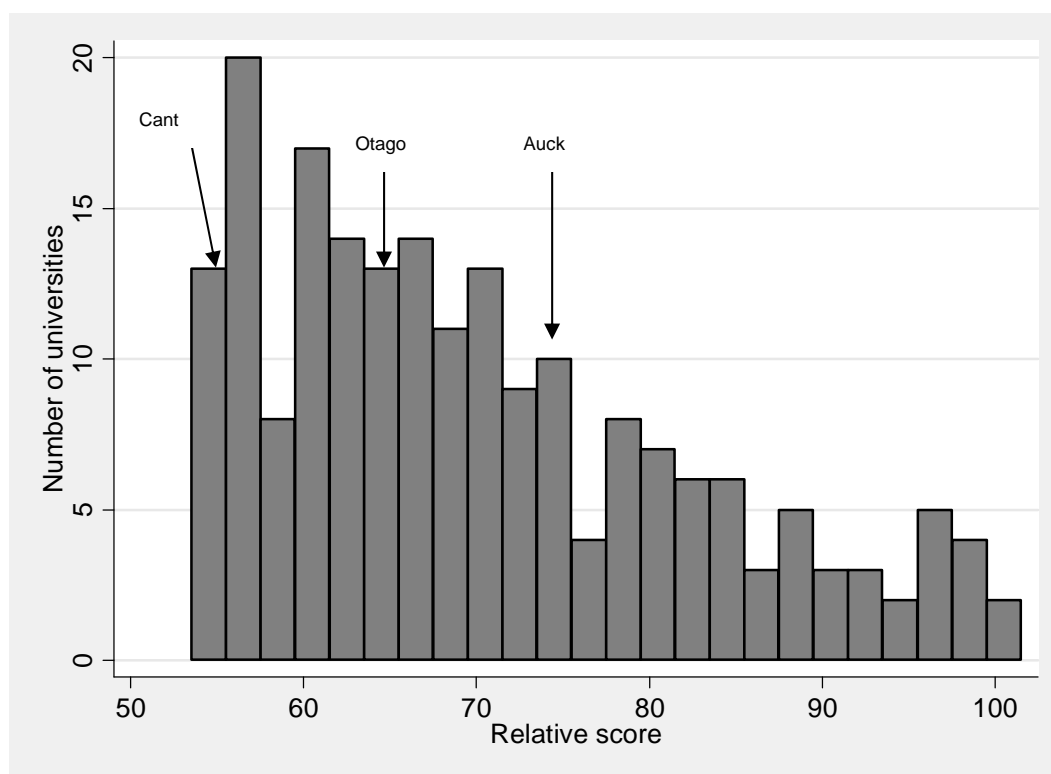


Table 10 presents THES rankings of the New Zealand universities over time. Because of changes to methodology, only the 2007 to 2009 rankings can reliably be compared.¹⁷ As one might expect over such a short a time frame, the rankings have been reasonably stable for New Zealand universities. The biggest change is exhibited by Massey University, which dropped 57 places between 2007 and 2009.¹⁸ Smaller drops were exhibited by the University of Auckland and the University of Otago, while the University of Waikato and Victoria University of Wellington improved their ranking slightly.

Table 10
Rankings of New Zealand universities in the THES 2007-2009

University	2007	2008	2009	Change in ranking 2007-2009
Auckland	50 (1)	65 (1)	61 (1)	↓ 11
Otago	114 (2)	124 (2)	125 (2)	↓ 11
Canterbury	188 (3)	186 (3)	188 (3)	0
Victoria	234 (5)	227 (4)	229 (4)	↑ 5
Massey	242 (4)	283 (5)	299 (5)	↓ 57
Waikato	319 (6)	378 (6)	314 (6)	↑ 5

Note: The figure in brackets is the ranking of the individual university among the ranked New Zealand universities.

Source: QS Quacquarelli Symonds (www.topuniversities.com).

¹⁷ The way that the THES rankings measured dispersion of performance changed in 2007.

¹⁸ A lack of available underlying data for Massey University means it is impossible to determine what caused the larger fall in performance.

Table 11 presents the overall score used to determine the rankings of the three New Zealand universities in the THES Top 200 between 2007 and 2009. This data is graphed in Figure 11. It suggests that, compared to the top-performing university (Harvard), the performance of all three New Zealand universities has declined. Note that the University of Canterbury maintained the same ranking in 2009 as it achieved in 2007, despite a slight drop in overall relative score.

Table 11

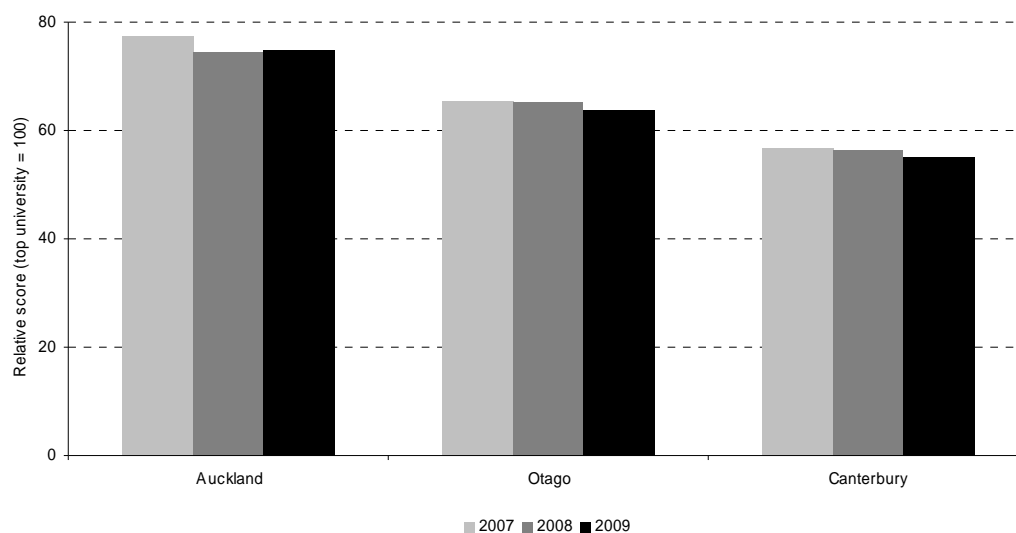
Overall relative scores of New Zealand universities in the THES Top 200 2007-2009

University	2007	2008	2009	% change 2007-2009
Auckland	77.5	74.5	74.7	-3.6%
Otago	65.6	65.3	63.8	-2.7%
Canterbury	56.6	56.4	55.2	-2.5%

Source: QS Quacquarelli Symonds (www.topuniversities.com).

Figure 11

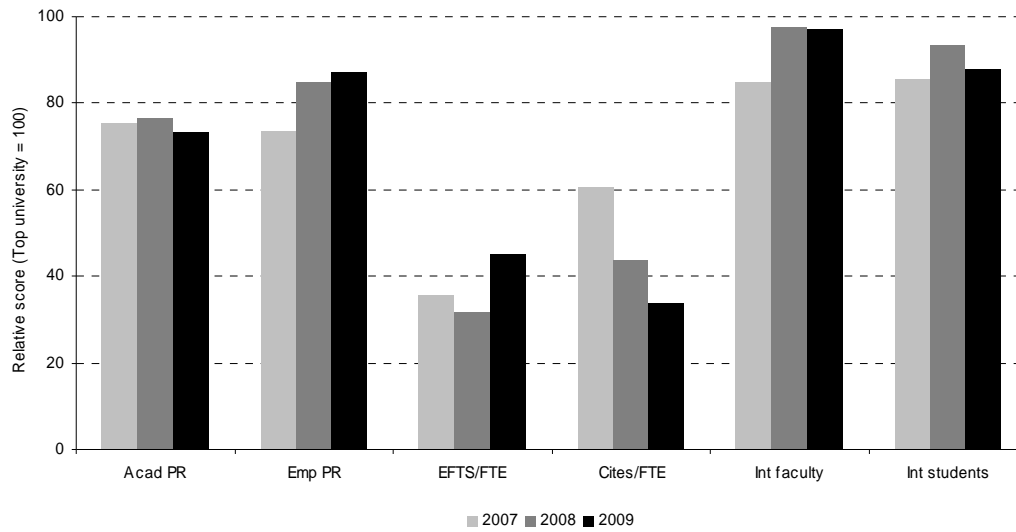
Overall relative score of New Zealand universities in the 2007-2009 THES Top 200 rankings



The average performance of the three universities in the Top 200 in each of the components in the THES between 2007 and 2009 is presented in Figure 12. This shows that the main areas of improvement have been better employer peer review and an increase in the proportion of international faculty, while the number of citations per FTE academic staff member has declined significantly. However, a change to the way that the citations were extracted from 2008 was likely to have been detrimental to the relative performance of the New Zealand universities, so, how much of this change is real rather than a result of the methodological change is hard to determine. The improvement in the number of EFTS per FTE academic staff between 2008 and 2009 is a result of the drop in international students at New Zealand universities. However, this has had the perverse effect of causing the performance in the international student measure to drop during this period.

Figure 12

Average relative score of New Zealand universities in the 2007-2009 THES Top 200 rankings by component



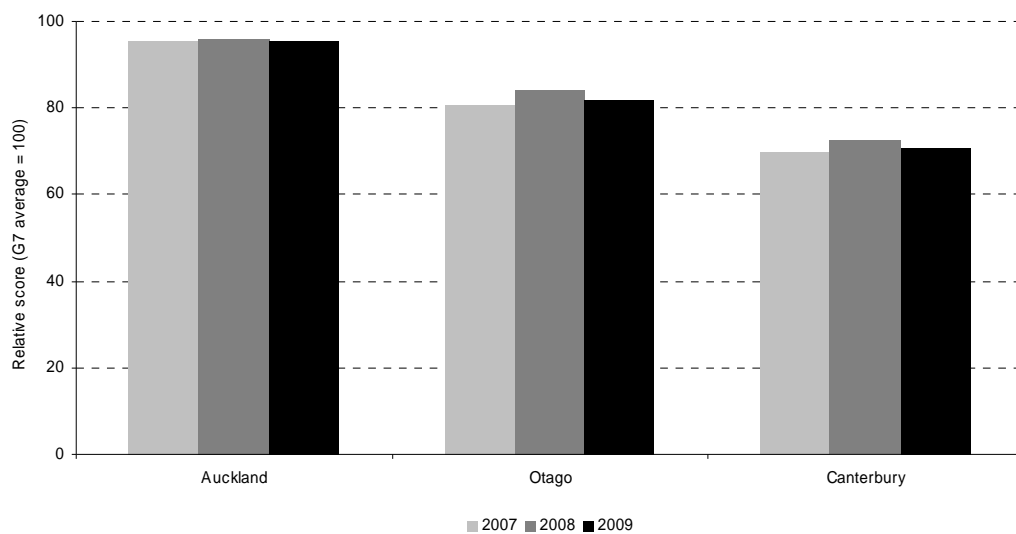
Note: The average is between the University of Auckland, University of Otago and the University of Canterbury.

The performance of three New Zealand universities to the G7 average is presented in Figure 13. In 2009, the University of Auckland (96) achieved a relative score very similar to the G7 average, with the Universities of Otago (82) and Canterbury (71) displaying lesser relative performance.

The data also shows that the ranked New Zealand universities have generally maintained their position relative to the G7 average between 2007 and 2009, compared to the decline in performance against the top university shown in Figure 11.

Figure 13

Relative scores of the ranked New Zealand universities in the 2007-2009 THES Top 200 compared with the G7 average score

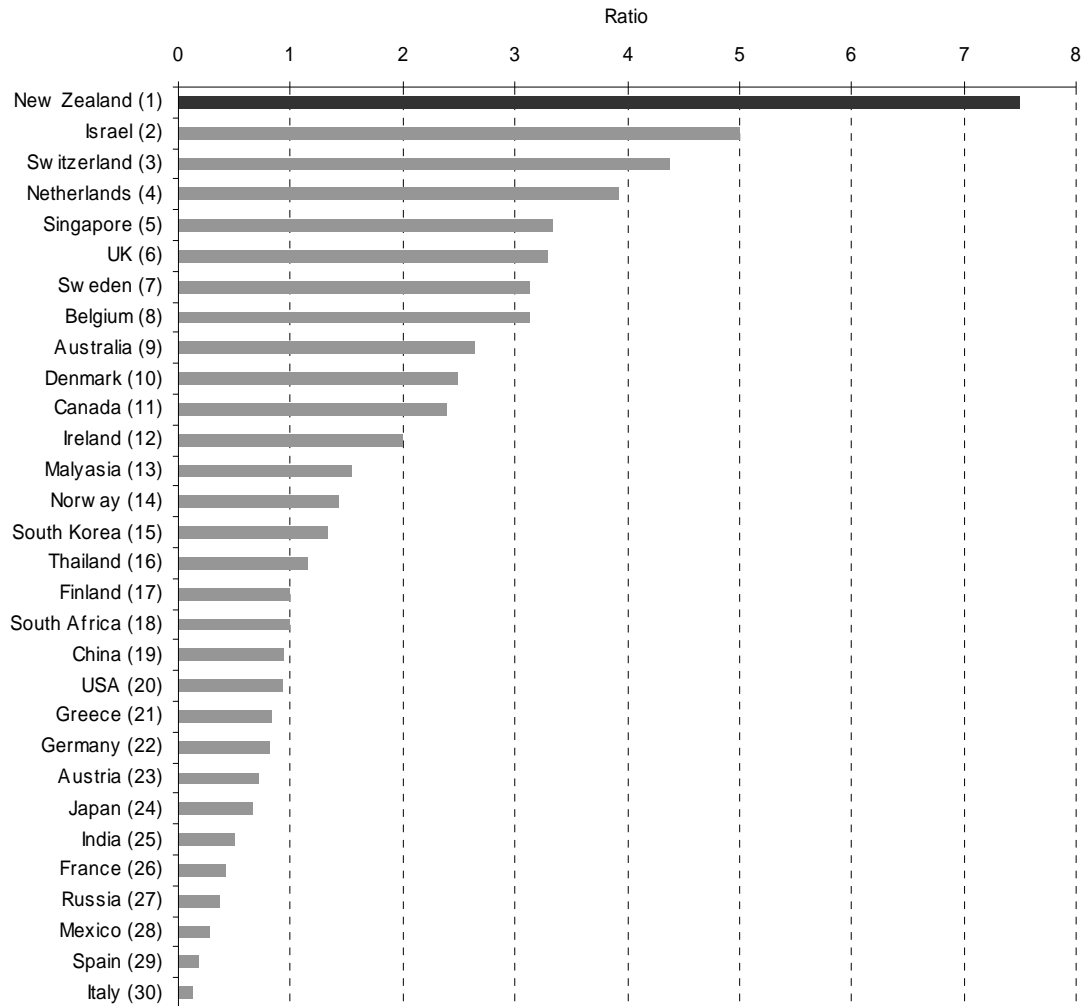


In Figure 14, the performance of each country in the THES is examined. For each country this shows the ratio of the percentage of universities in the Top 200 to the percentage share of total

GDP. New Zealand is the top country using this measure by some margin. The share of New Zealand universities in the Top 200 was more than 7 times New Zealand's share of total GDP.

Figure 14

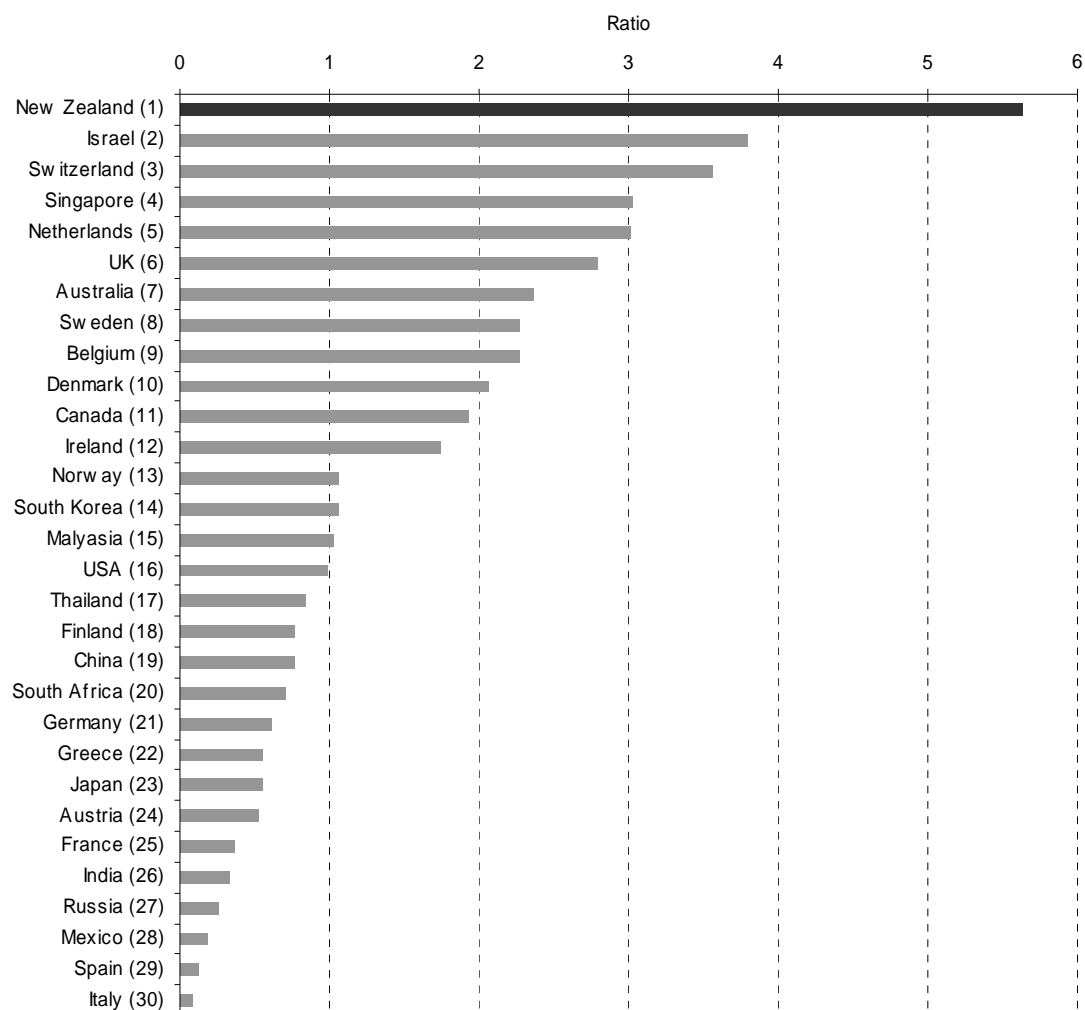
Ratio of the percentage of universities in the 2009 THES Top 200 per percentage share of total GDP by country



The relative ranking of the universities is not taken into account by the analysis in Figure 14. Figure 15 does take this into account, by measuring the ratio of the percentage share of the Top 200 overall points by universities in a particular country to that country's percentage share of world GDP. The data shows that the share of points in the Top 200 by the New Zealand universities is 7 times New Zealand's share of GDP. Once again, the New Zealand universities perform well. However, given the concerns about the methodology used to generate the THES rankings, this does not necessarily mean that any satisfaction can be taken from this good performance.

Figure 15

Ratio of the percentage of overall summed scores in the 2009 THES Top 200 per percentage share of total GDP by country

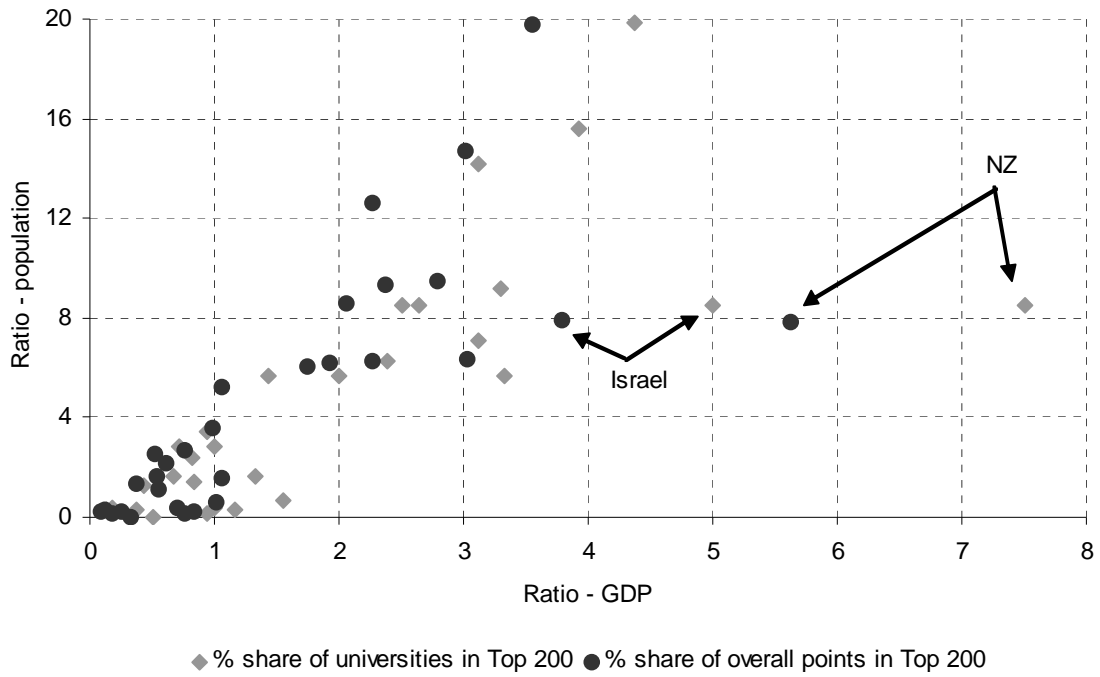


As was the case in section 3.1, the country results can also be examined by adjusting for share of population rather than share of GDP. Figure 16 presents country performance in the THES Top 200 when adjusted by share of GDP compared with country performance adjusted by share of population.

The results show that once again, New Zealand shifts from being an excellent performer when adjusting for share of GDP, to being more in the middle of the pack when adjusting for share of population. In the percentage share of universities in the Top 200 metric, New Zealand is ranked first (with a ratio of 7.5) when adjusting for share of GDP, but falls to a rank of fifth equal (with a ratio of 8.5) when adjusting for share of population.

Figure 16

Ratio of country performance per share of population and GDP in the 2009 THES Top 200 by measure of performance



4 CONCLUSION

Given that international university rankings systems appear to be here to stay, it is important that the information provided by these rankings is fully understood. The analysis in this report shows that delving beyond the overall ranking and understanding the limitations and scope of the ranking systems is key to assessing the performance of New Zealand universities in the right context.

The analysis of the ARWU Top 500 rankings shows that they understate the relative performance of New Zealand universities. Taking into account the size of the academic workforce or the size of the economy, New Zealand universities perform much better than is indicated by the overall rankings. In fact, when adjusting for size of the economy, New Zealand is among the top performing countries in the ARWU rankings. Getting this message across, when the focus is inevitably on overall rankings, is the challenge facing recruiters of international students.

From a policy perspective, the focus of the New Zealand government on funding research excellence in New Zealand, via the Performance-Based Research Fund (PBRF) and Centres of Research Excellence (CoREs) fund, should contribute positively to a continuation of relatively strong performance in the ARWU rankings.

Although New Zealand universities perform better in the THES Top 200 rankings, which include a mix of teaching, research and reputational measures, the methodology used to compile the rankings means that the results are arguably of less value than the ARWU rankings. This weakness has been acknowledged by the THES, which will be presenting a revised ranking system in 2010. It will be interesting to see what the revised THES rankings will look like and where the New Zealand universities will be placed.

A final consideration explored in this report was what to use as the benchmark for New Zealand university performance in the international rankings. The analysis suggests that instead of focussing on position in the overall rankings, it may be better to compare relative performance to the top world university, or, perhaps more appropriately, to Australian universities that are similar in nature to their New Zealand counterparts.

REFERENCES

Brooks, R. (2005) Measuring university quality, *Review of Higher Education*, vol 29, no 1, pp 1-22.

Higher Education Funding Council for England. (HEFCE). (2008) *Counting what is measured or measuring what counts? League tables and their impact on higher education institutions*, Higher Education Funding Council for England.

Holmes, R. (2006) The THES university rankings: Are they really world class? *Asian Journal of University Education*, vol 2, no 1, pp 1-14.

Marginson, S. (2007) Global university rankings: implications in general and for Australia, *Journal of Higher Education Policy and Management*, vol 29, no 2, pp 131-143.

Smart, W. (2009) *Making an impact*, Wellington: Ministry of Education.

Taylor, P., & Braddock, R. (2007) International university ranking systems and the idea of university excellence, *Journal of Higher Education Policy and Management*, vol 29, no 3, pp 245-260.

Usher, A., & Marino, S. (2006) *A world of difference: a global survey of university league tables*, Toronto: Educational Policy Institute.



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