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TITLE	The role of universities in the science, innovation, and technology system		
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AUTHOR/S	Nic Scott Input was provided by the Ministry of Education and the Tertiary Education Commission, but MBIE remains the primary author. Note MoE and TEC do not agree with all analytical judgements made in this paper and reserve the right to disagree with the analysis presented.		
PURPOSE	To provide an overview of the changing role of universities within New Zealand's SI&T system, including direct research outputs and wider impacts, relative to CRIs and international comparators where relevant and available.		

The evolving role of universities in New Zealand's SI&T system

This paper provides general background information on the role universities play in New Zealand's wider science, innovation and technology system, including comparisons to CRIs and international benchmarking where available. It provides data on research outputs (publications, patents) and inputs (funding, workforce), and cross-sector and international connectivity (co-authorship, funding). Some of this material has been presented to you already in other MBIE papers, however we reproduce it here for clarity and ease of use, with a small number of minor updates and corrections as available data have improved.

This paper relies heavily on bibliometric data from journal articles. These data tend to better capture basic research and more traditional academic disciplines over applied, interdisciplinary or collaborative research. The data will also tend to reveal more about some disciplines than others; for example, the humanities tend to rely less heavily on journal publications than natural sciences. While these data are useful for comparing across institutions or countries within a given discipline or type of research, we caution against comparisons that cross disciplinary or type boundaries.

SUMMARY

- **Universities are a much larger part of the SI&T system today than they were when the CRIs were established.** Universities' proportion of research outputs has grown from 80% to 90%, and their share of public research expenditure has increased from 42% to 58%.
- **The university sector is largely undifferentiated in terms of the research it undertakes.** Most New Zealand universities are active across the full range of academic disciplines, with research profiles similar to universities in other countries.
- **The quality of research is generally at world standard**, though there are few areas where we are leading the world.
- New Zealand universities, with the exception of the University of Auckland**, typically perform worse than universities in comparator countries on most measures of industry collaboration and economic application of knowledge.** Compared to overall science funding, limited amounts are dedicated to supporting or assessing industry cooperation and collaboration. Similar to the rest of the world, reliable metrics do not exist on other aspects of 'third mission' activity, such as arts or humanities based external work.

UNIVERSITIES ARE A LARGER PART OF THE RESEARCH SYSTEM NOW THAN THEY WERE WHEN THE CRIS WERE ESTABLISHED

On a range of measures, New Zealand universities make up a much more significant proportion of the Science, Innovation and Technology system today than they did 30 years ago, when the Crown Research Institutes (CRIs) were established. The proportions of R&D expenditure, research FTE and research publications contributed by universities have all increased over this period. New Zealand is by no means unique in this trend, with higher education expenditure on R&D overtaking other government expenditure on R&D across the OECD (noting that New Zealand's government sector was and remains much larger than average).

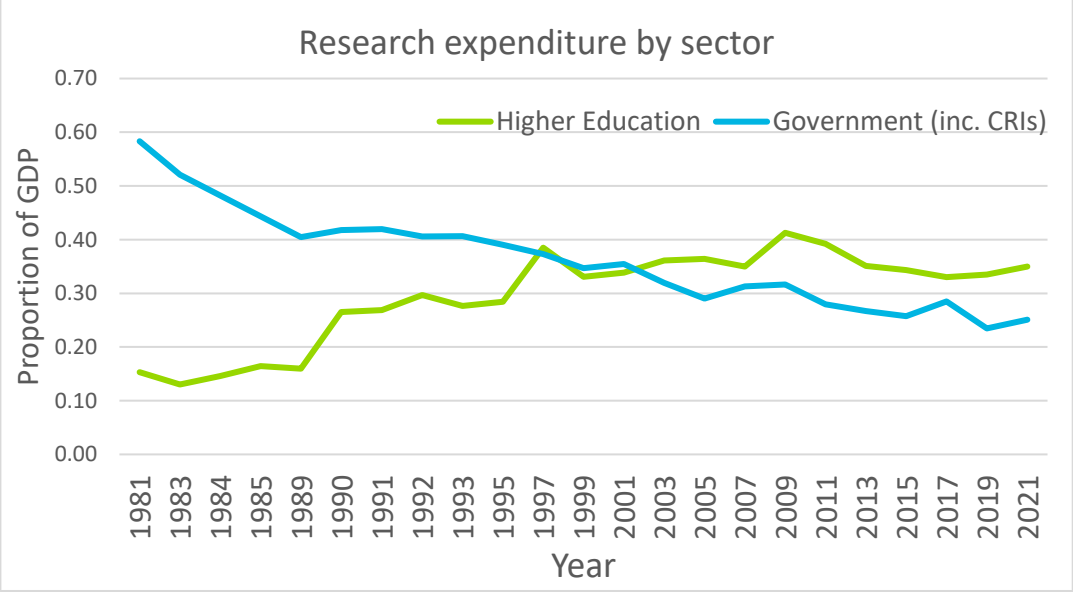

Figure 1 R&D expenditure as a proportion of GDP from the government (including CRIs) sector and from the higher education sector. Since the creation of the CRIs in 1992, the proportion of public R&D conducted by universities has outgrown that conducted by the government sector. Source | OECD Main Science and Technology Indicators

This is also reflected in the share of academic journal articles produced by universities (compared to CRIs). While universities have always produced the largest share of publications since the CRIs were created (being much larger institutions), the CRI share has decreased significantly over time, from around 20 per cent in 1995 to around 10 per cent in recent years.

While publications are not a comprehensive measure of research output (applied research in particular, where CRIs are more active, may be embodied in reports, patents, inventions or other diverse outputs which are not captured by bibliometrics), the trend does confirm that the role played by universities has grown over time.

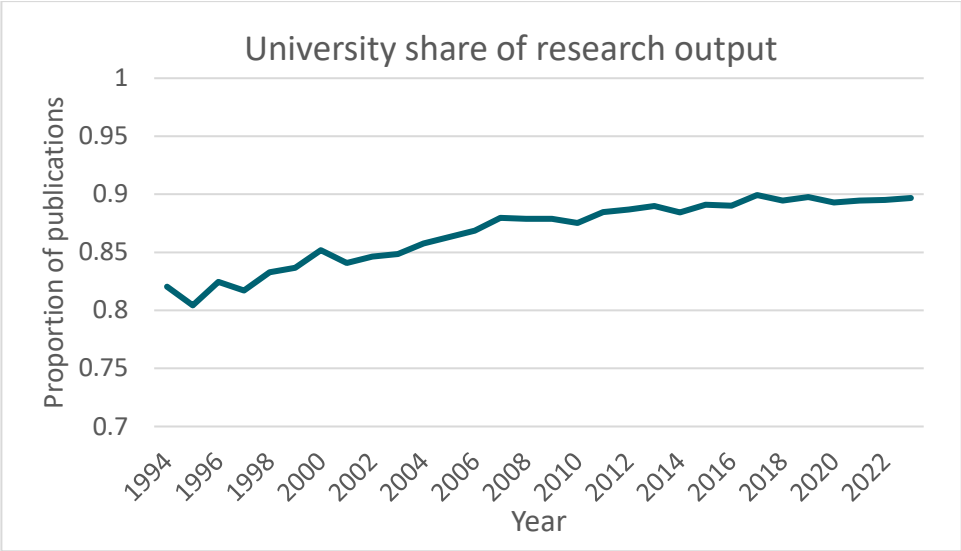

Figure 2 Share of academic journal publications produced by universities. While universities have always produced the largest share of publications, this has grown over time from around 4/5ths to around 9/10ths. Source | Dimensions bibliometric data

Reflecting this growth in activity, universities are increasingly receiving Vote Business, Science and Innovation (Vote BSI – MBIE) funding for research. This is partly due to their increasing success in funding competitions (e.g. the proportion of Endeavour Fund funding going to universities has increased from around 30% in 2017/18 to around 40% in 2022/23), but also due to increasing involvement in MBIE's strategic research funding (examples include the Data Science Platforms, Advanced Energy Platforms, RNA platform and Infectious Diseases platform, all hosted by universities).

The most recent figures from 2022 show that the universities collectively had research expenditure of around $1250 million, consisting of around $700 million from directly-funded research activity such as contestable research grants and contract research etc. and around $550 million from other sources. That $550m was supported from a range of sources including the PBRF ($315m), the government tuition grant, tuition fees, and other income sources. Institutions have a high degree of discretion over how they use these funds so it is not possible to identify with any degree of accuracy how Vote Tertiary Education funds are used and the degree to which cross-subsidisation occurs.

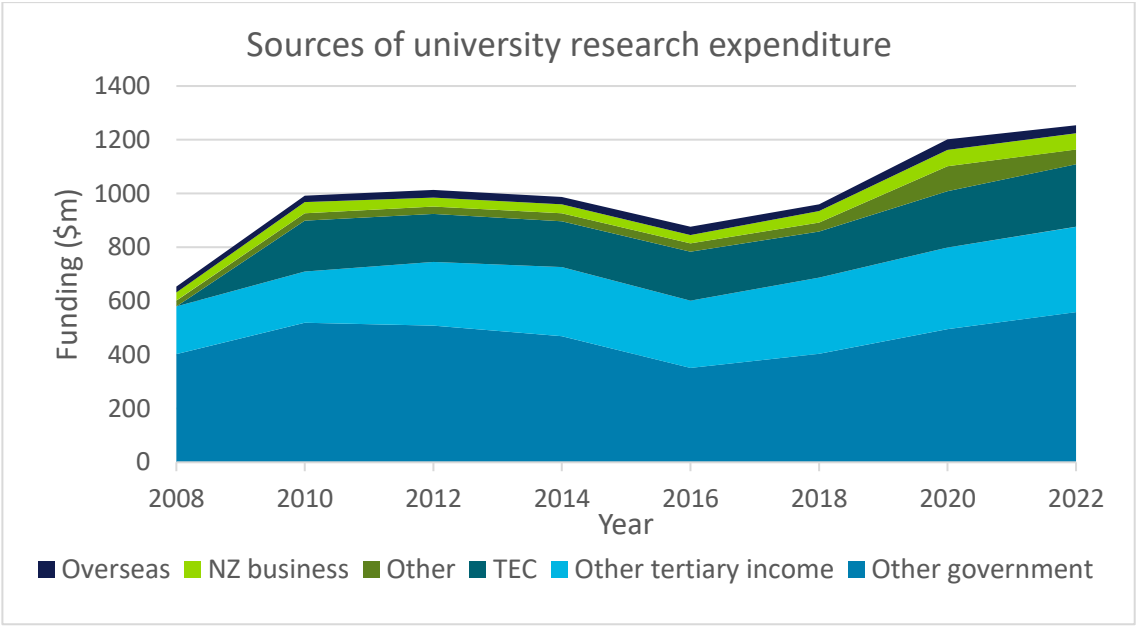

Figure 3 Source of funding for higher education R&D expenditure. Universities are being awarded an increasing share of Vote BSI research funding through both research competitions and strategic research funding initiatives | Source StatsNZ R&D survey

MOST UNIVERSITIES ARE ACTIVE ACROSS ALL RESEARCH DISCIPLINES WITH SIMILAR RESEARCH PROFILES TO THE TYPICAL GLOBAL INSTITUTION

Universities undertake research of all types and in all fields of research. Compared to the business and government sectors, they undertake a higher proportion of basic research (accounting for more than half of all basic research expenditure), but also undertake significant applied research and experimental development. The balance of basic, applied and experimental development research in New Zealand universities is similar to that in universities in other small advanced economies. Universities undertake research for a variety of purposes, with the three largest areas of expenditure being health, the environment and society.

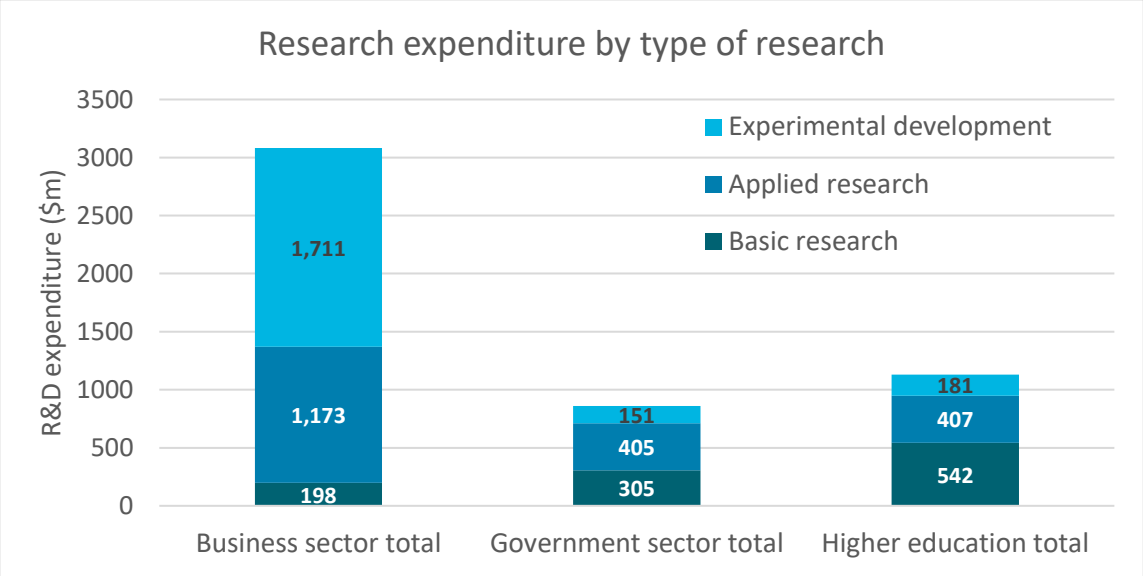

Figure 4 Type of research undertaken in different sectors. Universities carry out the majority of basic research, but also conduct significant applied research and experimental development. The relative proportions of these research types for New Zealand universities are similar to those of universities in other small advanced economies. Source | StatsNZ R&D survey

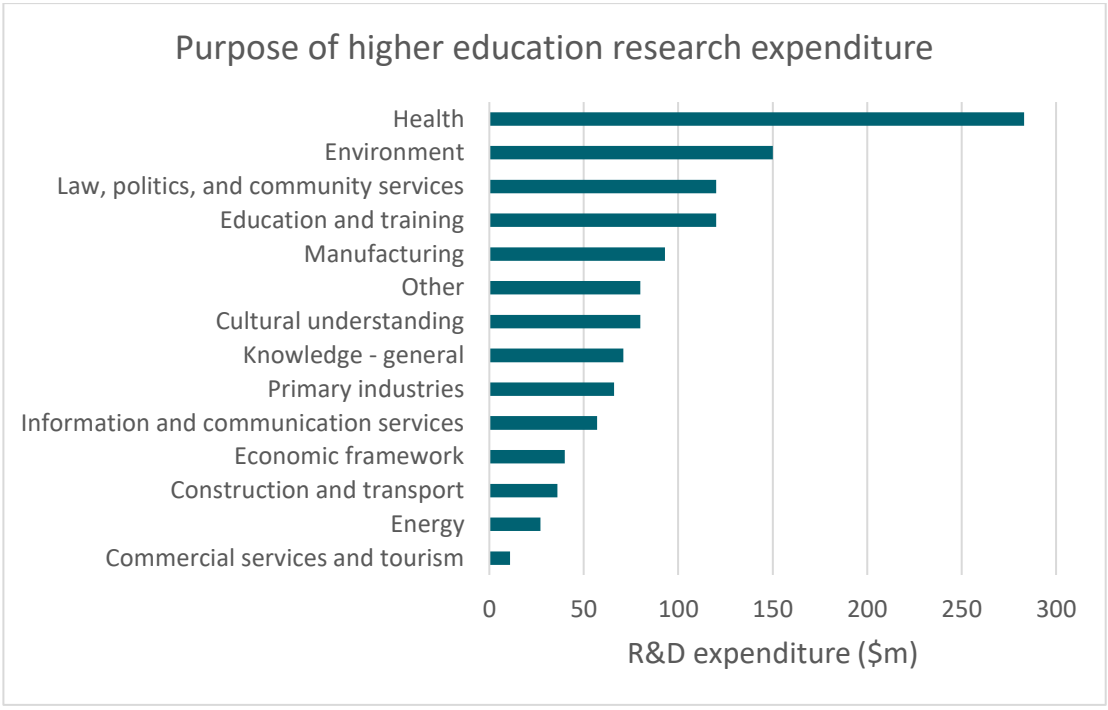

Figure 5 R&D expenditure in the higher education sector by purpose of research. Universities undertake research for a wide range of purposes, with particular areas of focus being health, the environment and society. Source | StatsNZ R&D survey data – note we have interpolated over several years of data to fill some annual gaps.

There is variation in the volume of research produced by different universities. The University of Auckland is responsible for around 1/3rd of all university research outputs, the University of Otago for around 1/6th of all university research outputs, and the remaining 6 institutions contributing around 1/10th each, with the exception of Lincoln University, which is a much smaller, more specialised institution.

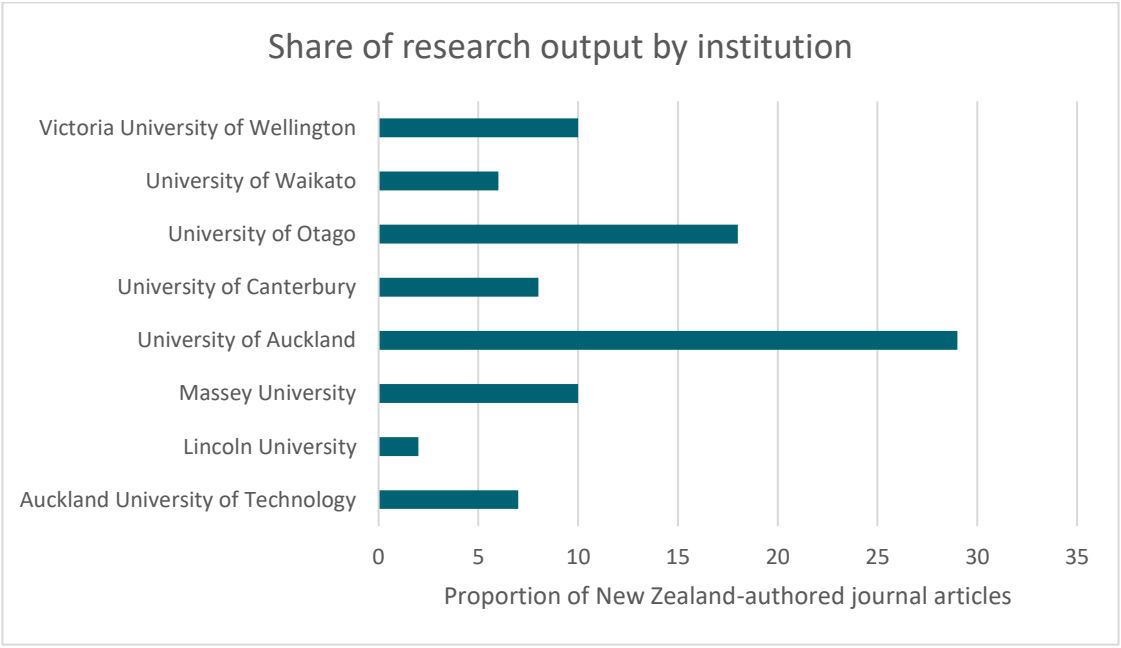

Figure 6 Proportion of total New Zealand journal articles produced by each university. Source | Dimensions bibliometric data

This variation in research output is reflected in the size of the research workforce at each institution.

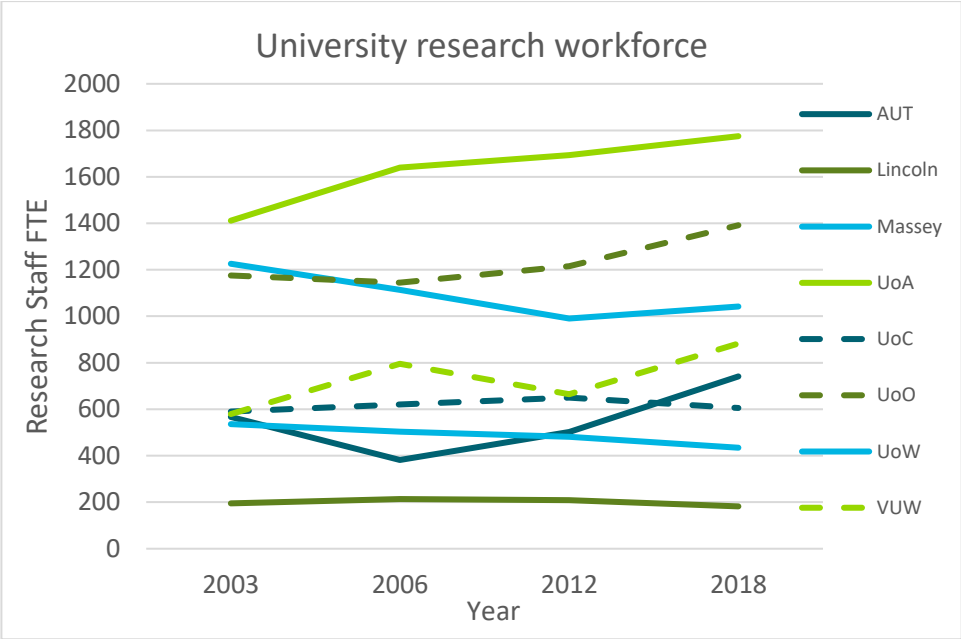

Figure 7 Full-time equivalent research staff by organisation. Individual organisation research workforces have been stable or seen modest growth over the past 20 years. As a whole, the university research workforce has grown by 12%, however much of this growth has been due to universities absorbing researchers from the former colleges of education. Source | TEC PBRF Quality Evaluation

Another measure of research output, and a critical input into the SI&T system, is the number of potential future researchers trained by the sector, quantified by research degree completions. Research degree awards have been relatively stable at just below 4,000 per year since 2015, with a modest drop of around 400 awards, or 10%, in 2020 following the Covid-19 pandemic. In New Zealand, only tertiary education organisations (primarily universities) can award higher degrees.

CRIs co-supervise approximately 300-400 research students per year. In practice this can range from minimal involvement in a narrow aspect of a research project to acting as primary supervisor and host institution, with university involvement limited to degree conferral and pastoral care.

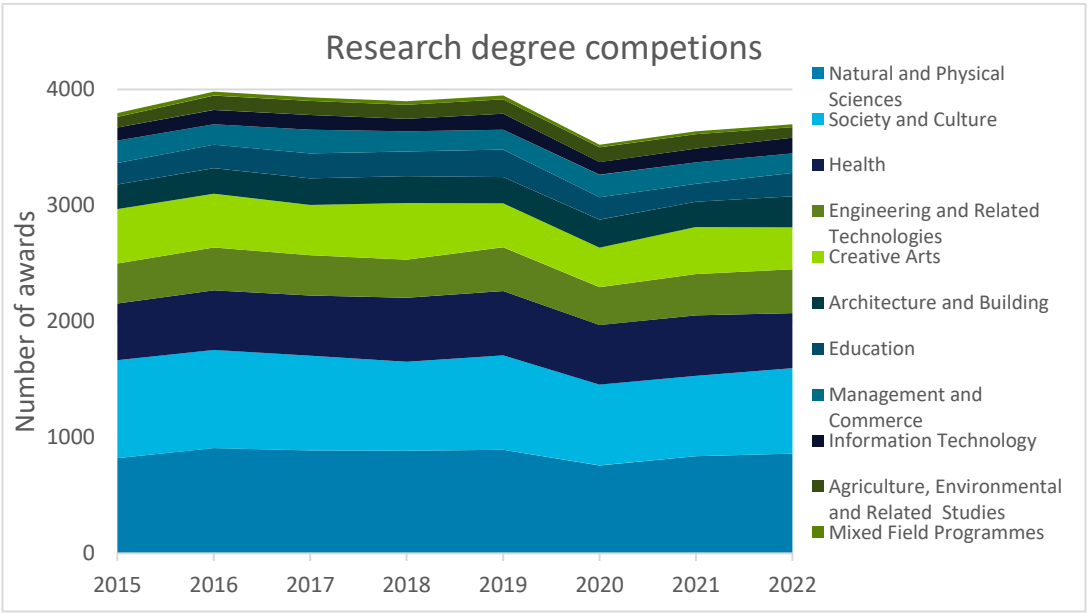

Figure 8 Research degree completions (including PhDs, masters by research and other research degrees) by subject area over time. Source | TEC PBRF Research Degree Completions

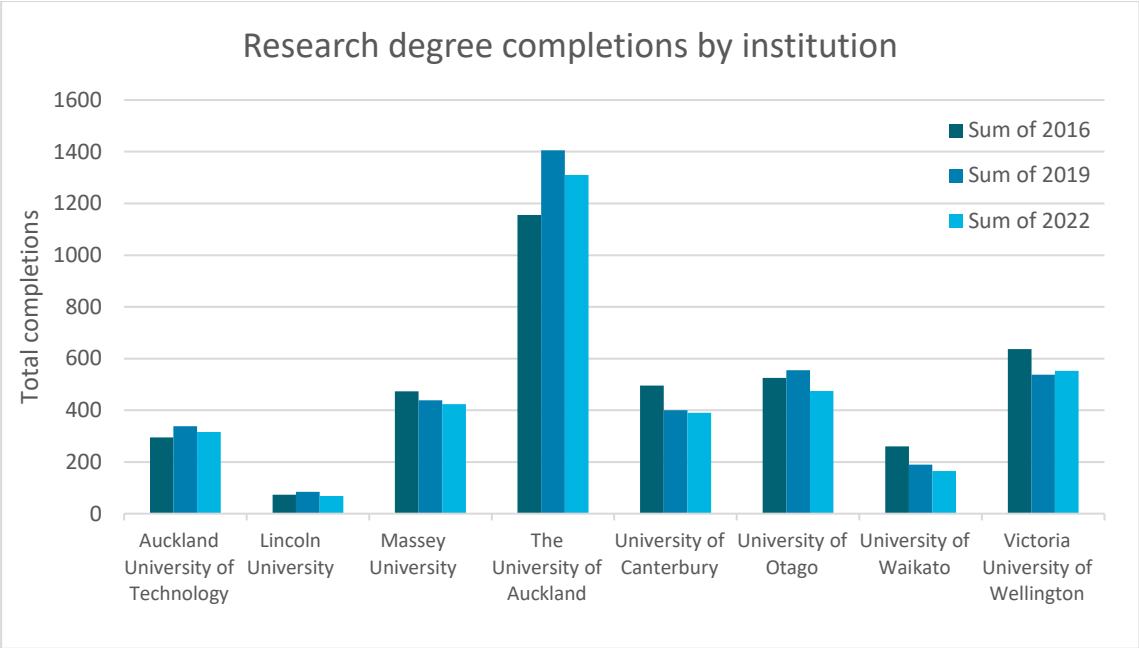

Figure 9 Research degree completions by institution. Institutional share of awards has changed little over the past 8 years. The share of research students trained largely follows share of research outputs, with the exception of the University of Otago. Otago produces more research articles than expected for the number of research students it trains – likely due to the large contribution to research from the medical school. Source | TEC PBRF Research Degree Completions

Individual universities are active across a wide range of research disciplines. This contrasts strongly with CRIs, where each CRI is active in only a small number of fields. Lincoln University is the only university with a strong subject specialisation in the areas of agricultural, environmental and biological sciences. Other universities show less specialisation (eg the University of Canterbury has higher than average activity across the STEM fields, whereas AUT has significantly lower activity than other institutions across the natural sciences), but undertake research across all fields to at least some extent.

Relative research output by institution and field of research

FoR Group	UoA	AUT	UoW	Massey	VUW	UoC	Lincoln	UoO
Agricultural, Veterinary and Food Sciences	0.44	0.39	0.44	3.11	0.19	0.41	5.48	0.51
Biological Sciences	0.81	0.34	0.92	1.23	0.81	0.94	2.00	1.13
Biomedical and Clinical Sciences	1.18	0.59	0.29	0.47	0.30	0.24	0.19	1.58
Built Environment and Design	1.05	1.77	1.00	1.65	1.42	1.11	0.91	0.41
Chemical Sciences	1.37	0.38	0.72	0.86	1.96	1.43	0.38	0.83
Commerce, Management, Tourism and Services	0.64	2.31	1.99	1.69	1.22	1.21	1.77	0.75
Creative Arts and Writing	0.88	2.50	1.33	1.14	1.44	0.78	0.22	0.42
Earth Sciences	0.64	0.21	1.36	0.69	1.61	1.34	0.91	0.84
Economics	0.60	1.27	2.41	1.25	1.52	0.83	3.05	0.72
Education	1.16	1.32	2.15	0.91	1.24	1.22	0.15	0.75
Engineering	1.32	1.32	1.25	0.78	0.99	1.98	0.59	0.33
Environmental Sciences	0.70	0.40	1.30	0.93	0.84	1.32	3.49	0.59
Health Sciences	1.13	1.99	0.73	0.85	0.50	0.45	0.16	1.60
History, Heritage and Archaeology	0.77	0.45	1.18	0.79	1.39	0.91	0.61	1.59
Human Society	0.86	1.02	1.67	1.46	1.73	1.22	1.17	0.96
Information and Computing Sciences	1.08	1.98	1.17	0.81	1.91	1.16	0.37	0.41

Language, Communication and Culture	0.91	1.41	1.58	1.36	2.14	1.28	0.22	0.52
Law and Legal Studies	0.84	0.79	1.38	0.73	1.94	1.28	0.23	0.73
Mathematical Sciences	1.43	0.54	0.69	1.04	1.94	1.93	0.14	0.62
Philosophy and Religious Studies	0.70	1.17	1.63	0.79	1.35	1.06	0.21	1.44
Physical Sciences	1.36	0.54	0.46	0.67	1.94	4.07	0.22	0.60
Psychology	1.10	1.20	1.50	0.84	1.55	1.11	0.09	1.40

Figure 10a Heatmap indicating areas of high, relative research output by university. Red and orange colours indicate an institution publishes more journal articles than the New Zealand average in a particular field, white and light yellow colours indicate low relative numbers of publications in a field. Source | Dimensions bibliometric data

FoR Group	**AgResearch**	**ESR**	**GNS**	**Landcare**	**NIWA**	**PFR**	**Scion**	**CRIs (total)**
Agricultural, Veterinary and Food Sciences	6.95	1.04	0.43	1.93	0.70	6.46	3.57	3.31
Biological Sciences	2.87	3.23	0.52	4.36	3.07	3.87	3.48	3.03
Biomedical and Clinical Sciences	0.53	1.00	0.00	0.08	0.04	0.26	0.03	0.24
Built Environment and Design	0.28	0.00	0.27	0.39	0.22	0.23	0.60	0.27
Chemical Sciences	1.03	1.96	0.80	0.43	0.22	1.14	1.59	0.87
Commerce, Management, Tourism and Services	0.16	0.19	0.10	0.17	0.06	0.41	0.24	0.17
Creative Arts and Writing	0.04	0.16	0.05	0.00	0.04	0.10	0.00	0.05
Earth Sciences	0.44	1.05	14.0	1.79	8.72	0.40	0.65	4.37
Economics	0.30	0.00	0.03	1.15	0.33	0.10	1.06	0.42
Education	0.05	0.05	0.03	0.13	0.06	0.00	0.09	0.06
Engineering	0.48	0.66	1.25	0.21	0.61	0.49	2.00	0.72
Environmental Sciences	2.67	2.65	0.69	6.80	5.40	2.72	5.48	3.61
Health Sciences	0.11	0.72	0.01	0.06	0.05	0.11	0.05	0.10
History, Heritage and Archaeology	0.13	1.17	0.23	0.53	0.19	0.11	0.00	0.25
Human Society	0.19	0.88	0.32	0.66	0.20	0.10	0.49	0.32
Information and Computing Sciences	0.15	0.58	0.11	0.29	0.18	0.19	0.21	0.21
Language, Communication and Culture	0.04	0.00	0.07	0.10	0.02	0.09	0.05	0.05
Law and Legal Studies	0.08	3.03	0.11	0.28	0.75	0.10	0.21	0.44
Mathematical Sciences	0.08	1.61	0.34	0.25	0.22	0.03	0.27	0.27
Philosophy and Religious Studies	0.07	0.26	0.04	0.23	0.14	0.00	0.09	0.10
Physical Sciences	0.12	0.42	1.12	0.15	0.17	0.10	0.36	0.34
Psychology	0.06	0.28	0.00	0.03	0.03	0.05	0.00	0.05

Figure 10b As above, but for the Crown Research Institutes. Individual CRIs are highly specialised, and the CRI sector as a whole is only active in a narrow range of fields: Agricultural, Veterinary and Food Sciences, Biological Sciences, Chemical Sciences, Earth Sciences and Environmental Sciences.

The health and biomedical sciences are significantly concentrated in the University of Auckland and the University of Otago – the two institutions that host medical schools, and Massey University has a particular focus on veterinary and food science.

We note here that this high-level approach to identifying research activity can hide significant specialisation within disciplines, particularly at a national level but also within individual institutions. For example, the University of Otago has a below-average output in the physical sciences overall, but hosts the Dodd-Walls Centre of Research Excellence for Photonic and Quantum Technologies, a significant cluster of expertise in the sub-discipline of quantum physics.

THE QUALITY OF UNIVERSITY RESEARCH IS TYPICAL FOR A SMALL ADVANCED ECONOMY, HOWEVER WE LACK A WORLD-LEADING INSTITUTION THAT OTHER SAES TYPICALLY HAVE

Our most comprehensive source of data on the quality of university research is that Quality Evaluation (QE) component of the PBRF. Every few years the QE assesses the performance of individual researchers against benchmarks calibrated against a global standard. These evaluations are then aggregated across institutions and used to allocate a portion of the PBRF.

These data show a consistent increase in researchers being awarded the highest two grades, A and B, over time, with the proportion of A and B grades rising from 33% in 2003 to more than 57% in 2018. The QE system is broadly based on the UK's Research Excellence Framework, which allows us to compare qualitatively to trends in the UK university sector (though the REF assesses departments rather than individual researchers so is not directly comparable). There we find a similar picture, with the proportion of units of assessment being awarded the highest two grades (3 and 4 star in that system) increasing from 47% to 84% between 2008 and 2021. While the proportion of top grades is significantly higher in the UK (84% versus 57%), we caution against making a direct comparison here given the different unit of assessment (departments versus individual researchers).

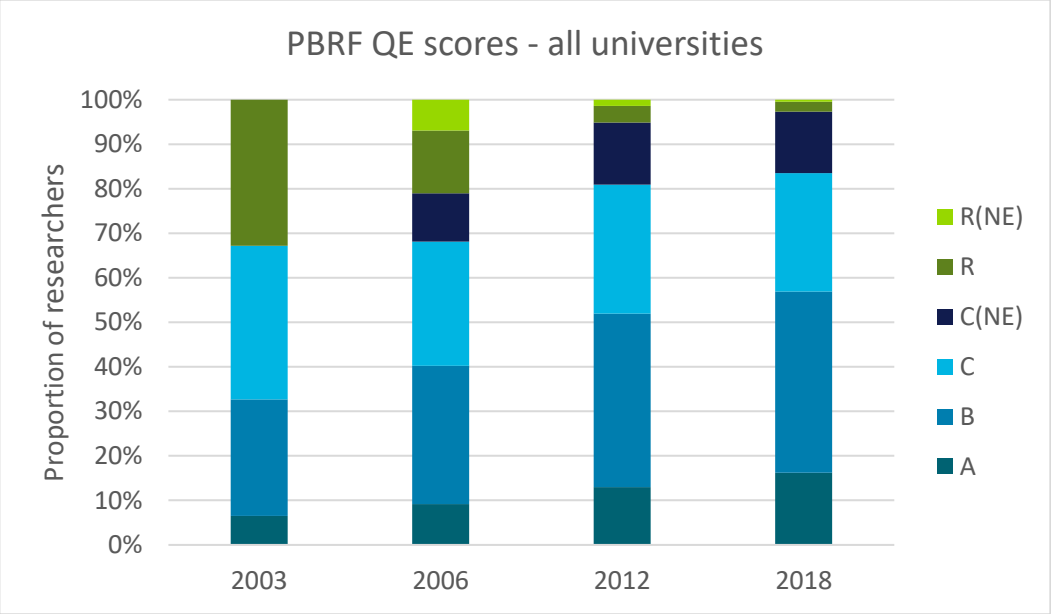

Figure 11 PBRF QE scores for all university-based New Zealand researchers submitted for evaluation. The proportion of researchers being assessed at the highest two grades, A and B, has steadily increased over time, with a corresponding fall in those being awarded the lower C or R grades. Note that the New Entrant 'NE' category was introduced in 2006. Source |TEC PBRF Quality Evaluation

Citations are often used a proxy for research quality, though one with well-documented limitations and biases. The Field Citation Ratio (FCR) metric accounts for varying citation rates between fields. By definition, the global average for this metric is one, therefore scores above one represent researchers, groups or institutions that are producing above-average quality research. On this metric, all New Zealand universities perform at well-above the world average, though with a modest decline in performance in recent years. As the FCR is a relative metric, this decline is driven more by other countries (particularly China) "catching up", rather than a fall in the quality of New Zealand research.

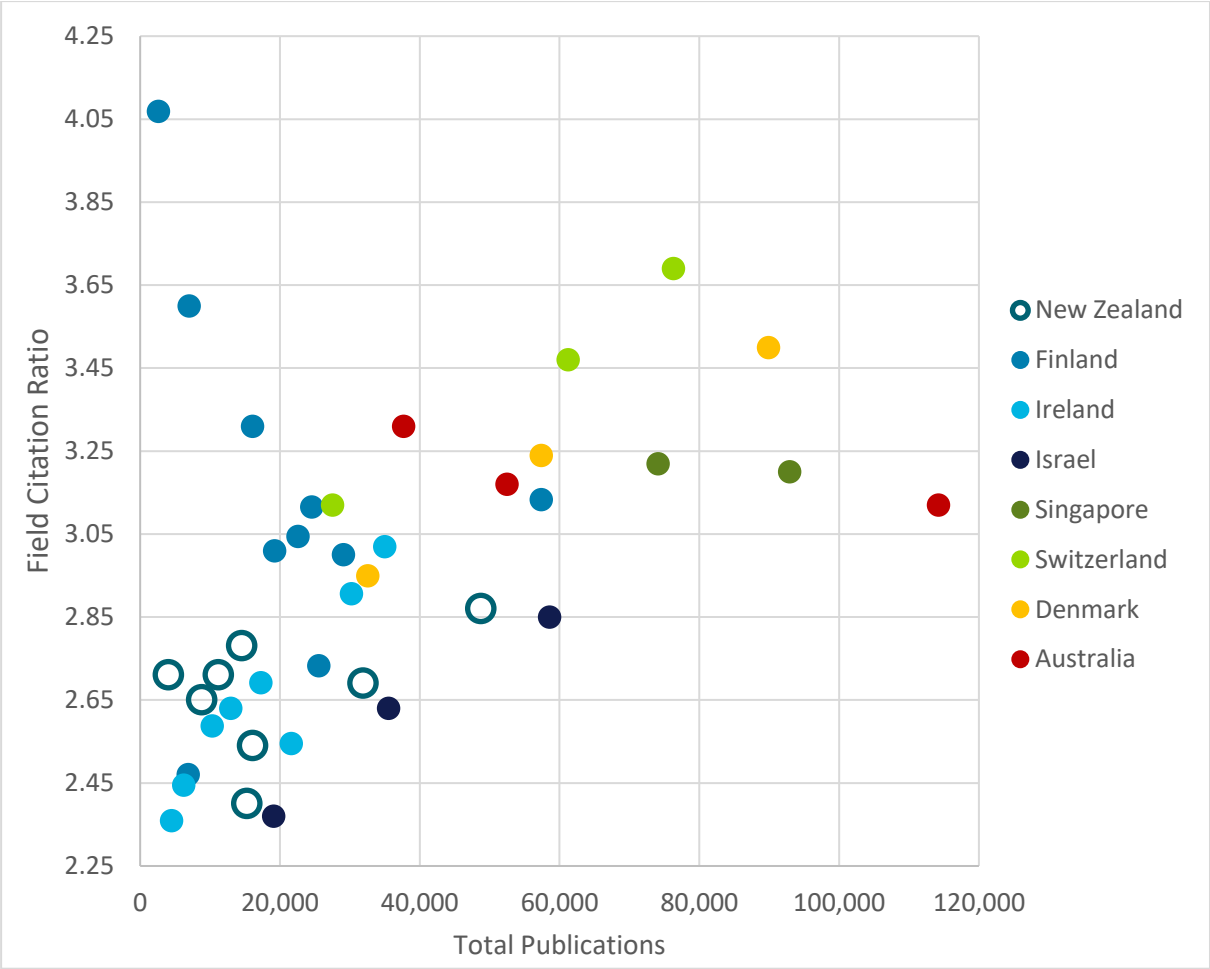

Figure 12 Average Field Citation Ratios and total publication numbers for New Zealand, Irish and Finnish universities and select universities from other comparison countries. Source | Dimensions bibliometric data (2013-2022). While New Zealand universities perform well above the global average in terms of quality (FCR), we lack a large, world-beating university that many other small advanced economy countries host.

New Zealand's universities are comparable to Ireland's and Israel's, both in terms of research output (quantified by total publications) and research quality (FCR). Finland also has a similar mix of institutions in terms of size, though with higher research quality on average. Most small advanced economies have one or two research-intensive universities with notably high research quality. Examples include: University College Dublin (Ireland), University of Helsinki (Finland) and National University of Singapore and Nanjing Technical University (Singapore). In Israel, the equivalent role is filled by the Weizmann Institute, though as this is a postgraduate-only institution we have not included it in the above diagram. The University of Auckland is the institution that most closely fits this role in New Zealand.

A similar picture emerges from university rankings data[1]. While the validity of such rankings is hotly disputed, they are influential in that they garner significant attention. While all New Zealand universities are ranked in the top 500 of global universities, only the University of Auckland (at rank 68) is in the global top 200. The table below includes the top-ranked large institution from a range of comparison countries. Many countries, particularly in Asia and Oceania, also host campuses of global top 50 universities that complement their own domestic institutions.

[1] Here we use the 2024 QS Universities rankings of the top 1500 global universities, however similar results are obtained with the Times Higher Education ranking. The rankings combine both teaching and research metrics, but again, similar results are found when isolating only the research components of the rankings.

Institution	Country	Rank (2024)	Rank (2023)
ETH Zurich	Switzerland	7	9
National University of Singapore	Singapore	8	11
University of Melbourne	Australia	14	33
University of Auckland	New Zealand	68	87
Trinity College, Dublin	Ireland	81	98
University of Copenhagen	Denmark	107	82
University of Helsinki	Finland	115	106
Tel Aviv University	Israel	215	260

Table 1 The highest-ranked university from comparator countries. Source | QS World University Rankings

New Zealand universities have 18 subjects ranked in the global top 50, as summarised in the table below. A further 33 departments are ranked in the top 100. Annex Two provides a summary of all university department rankings in the most recent QS subject ranking.

University of Auckland	
• Anatomy and physiology – 45 • Archaeology – 40 • Anthropology – 48 • Civil Engineering – 46 • Education – 37	• English Language & Literature – 48 • Linguistics – 49 • Marketing – 21-50 • Psychology – 45 • Sports-related subjects – 28
University of Otago	
• Anatomy and physiology – 30 • Dentistry – 40	• Hospitality & Leisure management – 44 • Sports-related subjects – 12
Massey University	
• Development Studies - 30	• Veterinary Science - 21
Victoria University Wellington	
• Linguistics – 48	
Auckland University of Technology	
• Sports-related subjects – 28	

Table 2 – Subject areas (by individual institution) ranked in the global top 50 Source | QS World University Rankings by Subject

There are more qualitative indicators of institutional specialisation in the presence of institutes, centres or similar clusters of expertise with world-class research reputations. Some centres, such as the Centres of Research Excellence are cross-institution collaborations involving multiple universities in significant roles. Others are more focused in individual institutions – examples include the Auckland Bioengineering Institute (University of Auckland), the Robinson and Ferrier Research Institutes (Victoria University Wellington) or the Biomolecular Interaction Centre (University of

Canterbury). We note that this approach to identifying specialisations is much more subjective and hard to consolidate into a comprehensive picture of institutional specialisation.

UNIVERSITIES ARE INCREASINGLY WELL CONNECTED INTERNATIONALLY AND WITH CRIS

Co-authorship of research articles provides a measure of collaboration across institutions, sectors and internationally. The vast majority (nearly 90 per cent) of New Zealand research articles include co-authors from more than one institution, which is similar to the levels of co-authorship seen in comparator countries.

There is reasonable cross-sectoral collaboration between universities and CRIs, with around 40 per cent of CRI research articles including a university co-author (the CRI co-authorship rate of university publication is much lower, as expected given the much higher volume of research articles from universities). Lincoln University collaborates with universities at around three times the level of other universities. From the CRI side, ESR has the highest rate of collaboration with universities (at around 55 per cent), with Scion having a much lower rate (below 30 per cent). Some notable strong collaborations stand out: Victoria University Wellington and GNS and NIWA; Lincoln University and PFR, AgResearch and Landcare Research; Massey University and AgResearch.

New Zealand universities are increasingly internationally connected, at a level similar to universities in comparator countries, from the proportion of journal articles with an overseas co-author.

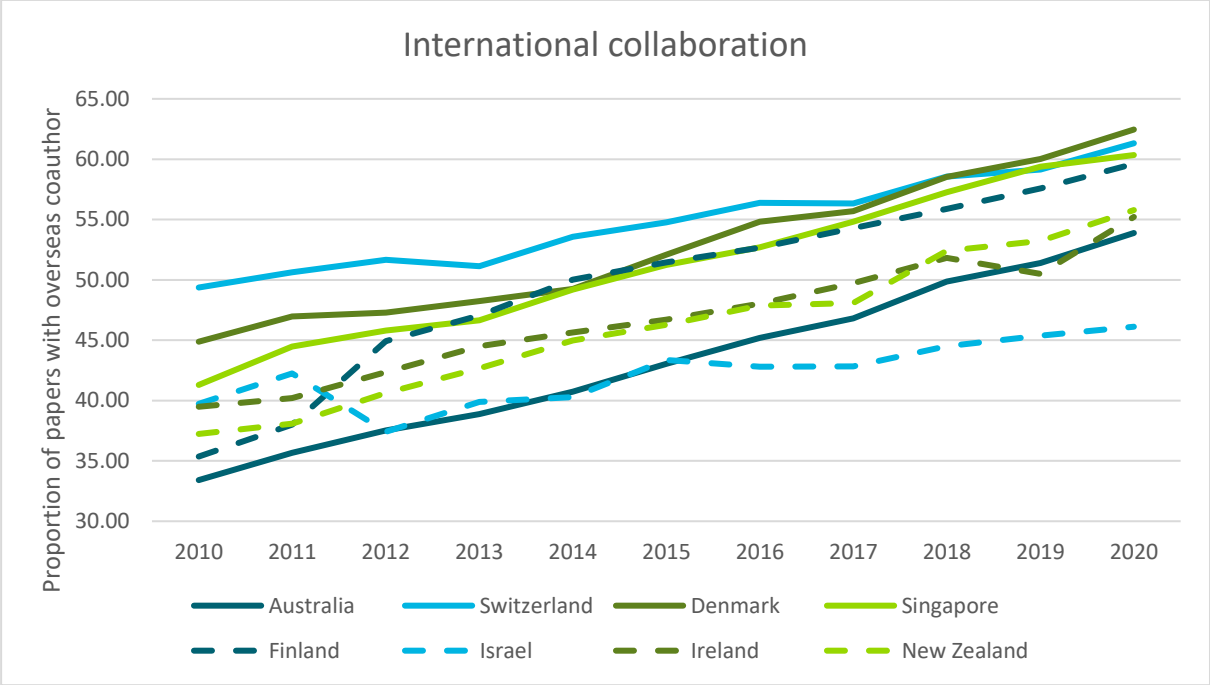

Figure 13 Proportion of research articles with an overseas co-author over time. Note that this includes research articles from both universities and other research organisations. As around 90 per cent of New Zealand articles are authored by universities, the trend shown can be directly applied to the university sector. Source | Dimensions bibliometrics data

For individual institutions, the University of Auckland, the University of Canterbury and Lincoln University have the highest rates of international co-authorship at around 60 per cent, with other institutions in the range of 50 – 55 per cent. The top collaborating organisations of most universities are other New Zealand universities (with the exception of Lincoln University, whose top collaborator is AgResearch). International institutions (typically universities in Australia or the USA) are amongst the top 5 collaborators for half of New Zealand universities.

ENGAGING WITH INDUSTRY HAS NOT BEEN PRIORITISED

Sources of research income can give some indication on how much of the research output of an institution has a clear and immediate application. By directly funding research, an end user indicates a high level of interest in the potential application of that research.

After accounting for general tertiary funding, universities receive most of their research income from government. The majority of this is through contestable processes funding investigator-led research (60%), with a smaller proportion for targeted research outcomes to meet the needs of the public sector (20%). The remainder comes from non-government sources in New Zealand including businesses (17%), or from overseas (7%). Lincoln University, Massey University and Victoria University Wellington receive a higher proportion of their external research income from public sector contract research or non-government sources than the other organisations. The University of Auckland receives the highest proportion of its research income from overseas (10%).

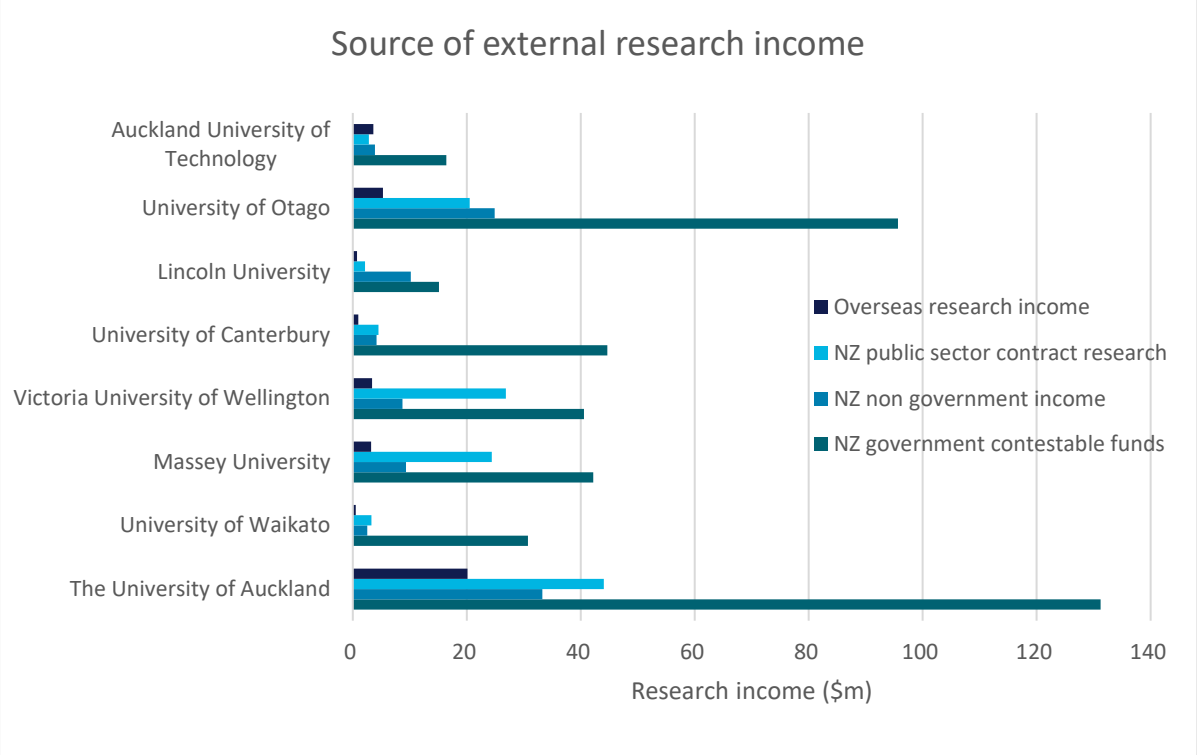

Figure 14 Sources of external research income (excluding the PBRF and other tertiary funding) by institution. Source | PBRF External Research Income data

On a per-GDP basis, New Zealand produces an unusually low number of patents. This fact is generally attributed to our lack of high-patenting industries; automotive, pharmaceutical, aerospace and defence. When we isolate the contribution of universities and public research organisations to patenting (the CRIs in New Zealand, government-owned research organisations in other countries) this remains true, with the notable exception of the University of Auckland.

The below table lists the total number of publications and patents from universities and public research organisations in New Zealand, Australia and Finland in the period 2018-2020. Australia and Finland are presented in comparison as countries with PROs of roughly similar size and scope (noting that NZ PROs are still unusually large).

For New Zealand universities, we have separated out the contribution of the University of Auckland. The table also gives indicates research productivity (publications or patents per $m of R&D expenditure in the sector) and the level of focus on applied knowledge over more academic knowledge (the ratio of patents to publications).

New Zealand universities perform well on measures of research productivity, with more publications per dollar than in comparison countries. CRIs produce similar numbers of publications than PROs in the comparator countries on a per-dollar basis, potentially reflecting a greater focus on applied and industry-facing science.

New Zealand universities focus more heavily on publications than patents than universities in Australia and Finland by factors of three and two respectively. CRIs patent at lower rates than equivalent organisations in other countries –in line with the overall analysis of New Zealand's low patenting rates.

	New Zealand			Australia		Finland	
	Unis (ex. Auckland)	Auckland	CRIs	Unis	PROs	Unis	PROs
Publications (2018-2020)	30,000	13,000	5,000	307,000	30,000	55,000	9,000
Patents (2018-2020)	219	473	156	5321	2326	789	855
Patents per thousand publications	7	36	30	20	80	15	95
Publications per $m in sector R&D expenditure	52	45	8	33	11	25	13
Patents per $m in sector R&D expenditure	0.38	1.65	0.25	0.58	0.89	0.36	1.22

Table 3 Total publication and patent numbers for universities and public research organisations (including CRIs) in New Zealand, Australia and Finland. The ratio of these two is a possible indication of the level of focus on applying knowledge versus generating new knowledge. The University of Auckland stands out as an institution with a strong focus on patenting. Source – Dimensions, OECD.stat

The exception to this trend is the University of Auckland, that has a much higher focus on and output of applied knowledge (in the form of patents) than other New Zealand universities. It also performs better than typical institutions in both Australia or Finland. The University of Auckland has a well-developed technology transfer and Venture Capital infrastructure that is integrated with both its research and teaching activities.

This relatively low focus on the application of knowledge is also seen in the amount of interaction between New Zealand universities and the private sector. Data on the proportion of university publications with an industry coauthor and the proportion of innovative businesses reporting interaction with a university show lower rates of collaboration in New Zealand than in comparison countries. As a partial counterpoint, New Zealand universities get a typical share of their funding from the business sector compared to universities in other countries.

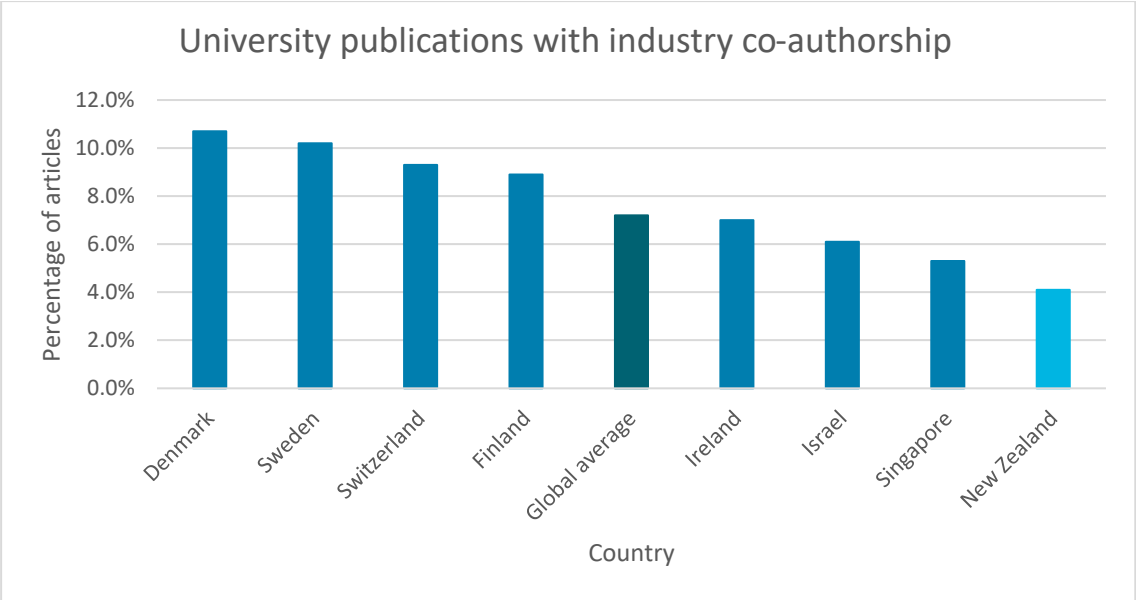

Figure 15 Proportion of university publications that include an industry co-author (2018-2020). Source CWTS | Leiden University Rankings (Open version)

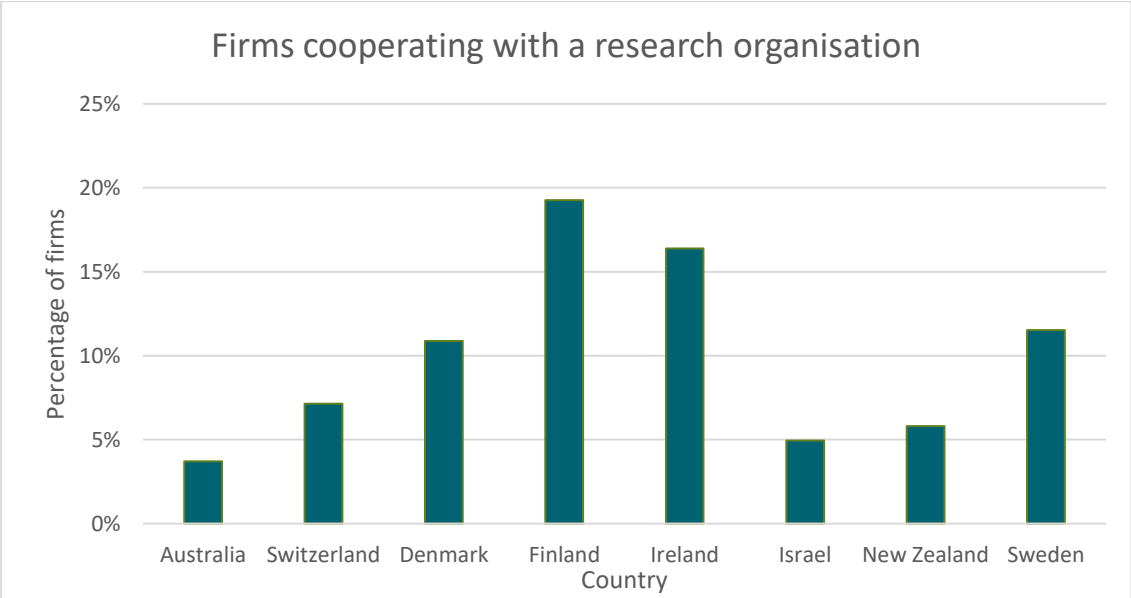

Figure 16 Innovative firms reporting co-operation with a university or other public research organisation in New Zealand and comparator countries (most recent year available). Source OECD | Business Innovation Statistics and Indicators

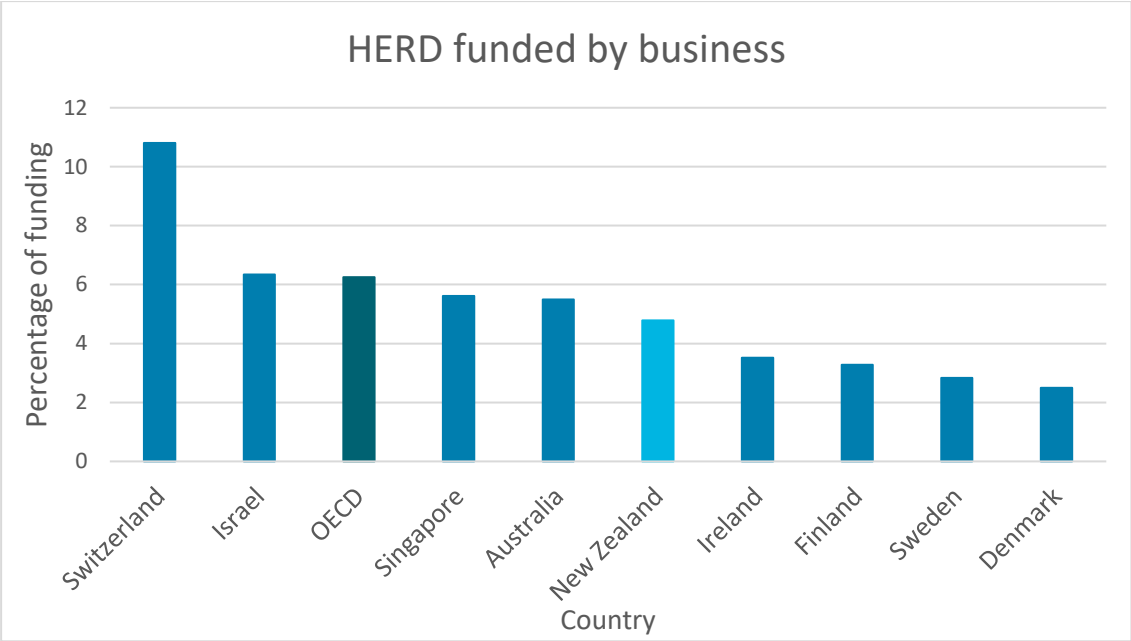

Figure 17 Higher education R&D activity funded by the business sector in New Zealand and comparator countries (most recent year available). Source OECD | Main Science and Technology Indicators

While there are no global comparisons of data on university commercialisation performance, the Survey of Commercialisation Outcomes from Public Research (SCOPR) conducted by Knowledge Commercialisation Australasia allows us to compare New Zealand universities amongst themselves and with those across the Tasman. In that survey, the University of Auckland performs consistently highly (3rd on active licenses, options and assignments, 2nd on commercialisation revenue, 1st on active start-up and spinout companies in 2022, out of 64 institutions). Of the other New Zealand universities, only Victoria University Wellington and the University of Otago feature for number of recent start-up or spinout companies (9th and 14th respectively).

REFLECTIONS

From the data presented here we can make several observations:

- New Zealand's university system is largely undifferentiated and unspecialised. Major exceptions are largely due to historical path dependency, such as Veterinary Science at Massey University and the location of the medical schools. Some specialisation emerges at a more detailed level.
- New Zealand universities, with the exception of the University of Auckland, typically perform worse than universities in comparator countries on most measures of industry collaboration. Compared to overall science funding, limited amounts are dedicated to supporting or assessing industry cooperation and collaboration.
- We have heard repeatedly from the business sector and other government agencies that academic culture (public or perish) and revenue-seeking (contestable funding and overheads, control of IP, spin-outs, limited mechanisms to work with big firms) from universities significantly hamper industry/government-university collaboration. A recent article in BusinessDesk[2] reinforces this message, though does note some improvements in universities' approach to intellectual property ownership and startup equity in recent years.

[2] "High stakes: university startups push for more ownership" (BusinessDesk, 8 May 2024).

ANNEX ONE – THE PERFORMANCE-BASED RESEARCH FUND

The Performance-Based Research Fund (PBRF) ($315 million) is aimed at increasing the quality of research in Aotearoa New Zealand by ensuring that excellent research in the tertiary education sector is encouraged and rewarded. This means assessing the research performance of tertiary education organisations (TEOs) and then funding them on the basis of their performance. Unlike R&D funding, which funds proposed future research activity, the PBRF is a reward-based fund which recognises already-completed research activity.

The PBRF is a Vote Tertiary appropriation. The Tertiary Education Commission administers and allocates the fund and is also responsible for the operational design and delivery of the Quality Evaluation.

PBRF funding is awarded as a bulk fund to support TEO research capability, including postgraduate-level teaching support. TEOs have a large degree of discretion as to how they use their PBRF funding.

Eligible TEOs that choose to participate in the PBRF must participate in all three components to receive funding. The three components are:

- The Quality Evaluation (used to allocate 55% of the funding pool)
- Research Degrees Completions (used to allocate 25% of the funding pool)
- External Research Income (used to allocate 20% of the funding pool)

The Research Degrees Completions and External Research Income components are based on annual data returns.

The Quality Evaluation is a peer-review assessment of the research performance of eligible staff. TEOs present their staff members' research in Evidence Portfolios, which are assessed for quality by expert peer review panels. Evidence Portfolios are awarded one of six Quality Categories, which are benchmarked relative to international standards of research quality, reach, and significance. Four Quality Categories (A, B, C, and C (New and Emerging Researcher)) attract funding. Two Quality Categories (R and R (New and Emerging Researcher)) do not attract funding. Funding is allocated on the basis of each TEO's overall performance in the Quality Evaluation.

There have been four previous Quality Evaluations in 2003, 2006 (a partial round), 2012, and 2018. The Minister for Tertiary Education and Skills has recently decided to cancel the next Quality Evaluation, which was due to take place in 2026.

ANNEX TWO: RESULTS OF THE 2024 QS WORLD UNIVERSITY RANKINGS BY SUBJECT FOR NEW ZEALAND UNIVERSITIES

Faculty	Subject	Auckland	Canterbury	Otago	VUW	Massey	Waikato	AUT	Lincoln
Arts & Humanities	Archaeology	39=		51-100					
	Architecture / Built Environment	51-100			201-240	101-150			
	Art & Design	151-200				101-150		201-240	
	English Language & Literature	48=	251-300	151-200	61		301-330		
	History	101-150		151-200	101-150				
	Linguistics	49=	71=	251-300	48			301-320	
	Modern Languages	66	251-300	101-150	151-200				
	Performing Arts	51-100			51-100				
	Philosophy	101-150		51-100	151-200		201-210		
	Theology, Divinity & Religious Studies	101-140		51-100	51-100				
Engineering & Technology	Engineering - Chemical	151-200	301-350		401-430				
	Engineering – Civil & Structural	46	51-100						
	Engineering – Electrical & Electronic	119=	251-300		351-400			451-500	
	Engineering – Mechanical, Aeronautical & Manufacturing	108=	251-300					401-450	
	Computer Science & Information Systems	99=	351-400	451-500	201-250	601-650	401-450	451-500	
Life Sciences & Medicine	Agriculture & Forestry		151-200	101-150		71	301-350		101-150
	Anatomy & Physiology	45=		30				101-150	

Faculty	Subject	Auckland	Canterbury	Otago	VUW	Massey	Waikato	AUT	Lincoln
Natural Sciences	Biological Sciences	151-200	551-600	151-200	601-650	401-450			
	Dentistry			40=					
	Medicine	118=		144=	451-500			451-500	
	Nursing	51-100		51-100		101-150		151-200	
	Pharmacy & Pharmacology	54		101-150					
	Psychology	45	201-250	101-150	101-150	251-300	301-330		
	Veterinary Science					21			
	Chemistry	150=	451-500	301-350	451-500	451-500			
	Earth & Marine Sciences	101-150	151-200	151-200	101-150				
	Environmental Sciences	113=	201-250	301-350	301-350	301-350	501-520		501-520
	Geography	51-100	51-100	101-150	51-100	151-200	201-230		
	Geology	101-150	151-200	201-240	101-150				
	Geophysics	101-150	151-200	201-240	151-200				
	Materials Science	151-200							
	Mathematics	105	501-550	501-550	301-350				
	Physics & Astronomy	201-250	351-400	451-500	351-400	601-640			

Faculty	Subject	Auckland	Canterbury	Otago	VUW	Massey	Waikato	AUT	Lincoln
Social Sciences & Management	Accounting & Finance	56	251-300	201-250	151-200	151-200	201-250	201-250	
	Anthropology	48=		101-150					
	Business & Management Studies	116=	351-400	301-350	301-350	351-400	401-450	301-350	
	Communication & Media Studies	101-150		151-200	151-200	51-100			
	Development Studies	51-100			51-100	30=			
	Economics & Econometrics	104=	301-350	251-300	251-300	301-350	301-350	401-450	501-550
	Education	37	201-250	151-200	151-200	201-250	201-250	351-400	
	Hospitality & Leisure Management	51-100		44	51-100			51-100	51-100
	Law	55	201-250	151-200	81		251-300		
	Library & Information Management				51-70				
	Marketing	21-50							
	Politics & International Studies	101-150	151-200	201-250	51-100				
	Social Policy & Administration	51-100							
	Sociology	95=	301-350	101-150	101-150	301-350	251-300		
	Sports-related Subjects	28=		12			51-100	28=	
	Statistics & Operational Research	101-150							