



IRU discussion paper – June 2023

## Concentration and diversity in Australian research funding, output and impact

- The Australian higher education system contains a mix of institutions – the research-intensive universities established under an elite system and newer research universities established to serve massification in the 1960s and 1970s, and universal access since the 1990s. Despite broadening student access to higher education, university research funding and expenditure has remained stubbornly concentrated in the original research-intensive universities.
- The universities in the Group of Eight (Go8) account for roughly two thirds of all research funding and expenditure and this proportion has remained stable for at least two decades. But Australia is no longer reliant on the Go8 members to produce the bulk of country's research output. The Go8's role has steadily declined from 66% of all outputs in 2006 to 56% in 2020. In some fields the Go8 are now minority performers.
- The broadening of research excellence across the Australian university sector is a unique success story, leading to greater differentiation, productivity and equality. Other countries, such as Canada and the UK, remain heavily reliant on a minority of research-intensive universities to support their national research systems. A more concentrated research system entails greater risks and inherent geographical inequalities. With the growth in high-quality research across a broader range of universities, the Australian system is now more equal and is outperforming Canada and the UK in publication output growth rates.
- The universities that have driven this expansion of Australia's research system over the past two decades have increased research quality and productivity while also simultaneously increasing collaboration with industry and other end-users of research. All of this has occurred in spite of the funding system, rather than by policy design. In future policy reform through the Universities Accord process, the Australian Government should be cautious about further skewing public research funding towards a minority of universities.
- As shown by the data below, the entire Australian university system has increased research quality, productivity and collaboration since the early 2000s, with the greatest gains coming from outside the Go8 universities:

**Research outputs:** increasing 69% at Go8 universities versus 165% for others since 2006.

**Highly cited output (top-10% cited):** increasing 91% at Go8 versus 277% for others since 2006.

**International research collaboration:** increasing 255% at Go8 versus 482% for others since 2006.

**Industry research collaboration:** increasing 292% at Go8 versus 420% for others since 2006.

**Research output per staff:** increasing 57% at Go8 versus 109% for others since 2006.

**Research expenditure per output:** increasing by 4% per output (in nominal terms) at Go8 since 2006 versus a decrease of 20% for others over the same period.

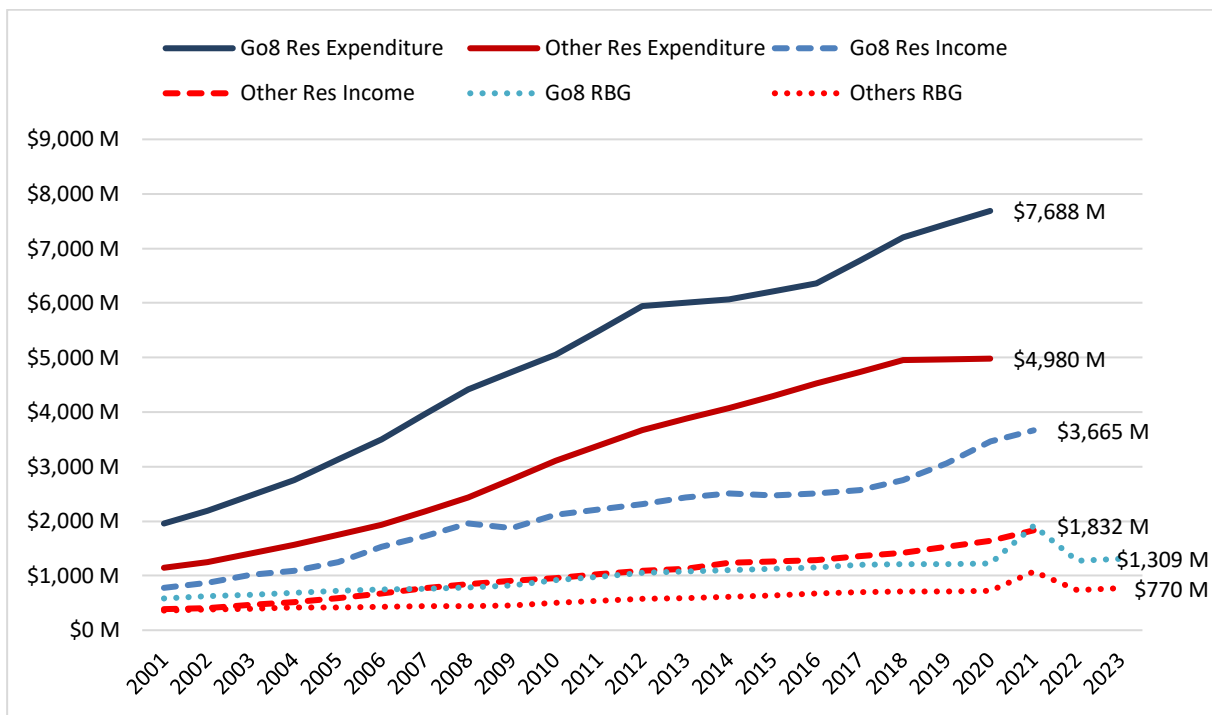
## Policy implications

- The past 20 years has been a success story of greater differentiation, productivity and equality through a broadening of research excellence. But it has not developed out of a clear policy design. Into the future, we should consider how policy and funding can consolidate and embed these gains to build a research system that is fit for purpose for the next 20 years.
- The first principle should be to “do no harm”. Australian universities have been extremely successful in their ability to use scarce resources efficiently for discovery and engaged research, particularly outside the Go8. All universities must continue to be supported for their research mission through funding that supports university autonomy and academic freedom.
- A second principle is focus on what is within the control of public policy. Australia’s research gains have relied on an insecure and geographically skewed funding base (e.g. international and postgraduate course fees, and research consultancies), alongside a costly and inefficient National Competitive Grants Scheme (NCGP), and a concentrated Research Block Grant (RBG) system. Research policy cannot directly influence where international students or research end-users locate, but it can ensure that public funding underpins baseline research excellence across Australia, particularly in areas where other revenue cannot supplement public funding.
- Australia needs to maintain a balanced research system and recognise differentiation. Universities exist to serve their local communities through their research and teaching missions. Universities within the same localities may serve different sub-sections of their community, including different regions, industries and low-SES, first-in-family or Indigenous and linguistically diverse backgrounds. Public policy should support a balance between how different communities are served, ensuring all Australians can benefit from a research-informed university education.
- Ideas for further concentration of research should be treated with great caution. These include differentiation through concentration, a focus on metropolitan centres or creating a small number of Federal research-intensive universities. Directing more funding through RBG and NCGP would indirectly support the same goals and risk undermining the great gains Australia has made over the past two decades.
- An imbalanced system disadvantages students from equity groups (low-SES, regional, Indigenous, first-in-family) and the populations in their localities because the research-intensive institutions are typically least representative of their populations. The Go8 members teach just over one fifth (21%) of all Australian domestic undergraduate students and one tenth of Australia’s low SES (12%), Indigenous (12%) and regional or remote students (11%). Concentration of research activity means students from disadvantaged backgrounds and regions gain less exposure to research-engaged academics, or pathways to research careers.
- The relationship between research funding and teaching domestic students was severed by the Job Ready Graduates (JRG) package, which led to only a nominal research contribution for teaching domestic students. There are legitimate concerns that funding research through teaching domestic students can lead to “perverse incentives” to teach more students in fields where there are greater surpluses to support a “cross-subsidy” for research. But supply does not dictate demand in a competitive and (mostly) demand-driven system. Students decide what or where to study. The key goal must be to ensure that funding for all fields of education, for all students and in all regions of Australia, is sufficient to support a research mission and for teaching staff with secure careers where they are paid to undertake research and scholarship.

## Research income, expenditure and support

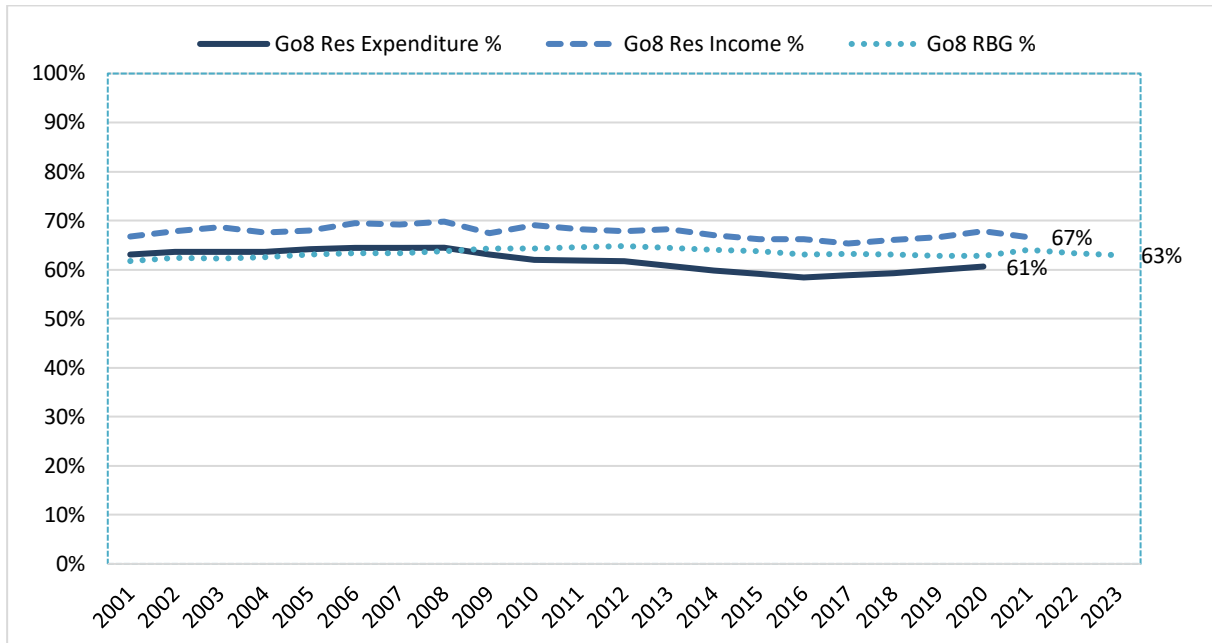
- Australian universities have experienced significant increases in research income and expenditure over the past two decades, increasing by roughly five times between 2001 to the early 2020s. But public research support through RBG has only roughly doubled over this period.
- Research funding, expenditure and public support are concentrated at Go8 members. The Go8 generated 67% of all research income (in 2022), received 63% of all publicly funded RBG (in 2023), and comprised 61% of all university research expenditure (in 2020). The concentration of income, expenditure and support at the Go8s has remained very stable for at least two decades.
- Although the past two decades have seen shifts in the distribution of income, expenditure and support across individual universities and regions (e.g. NSW and Victoria increased from 52% of all research expenditure in 2000 to 59% by 2020), the Australian higher education sector as a whole has maintained relative stability in its concentration and structure of support. This may not have been the policy intent, but it has led to an evolution of a sector with a broad range of research-intensive universities.

**Figure 1. Research expenditure, research income and Research Block Grants at Go8 versus other universities, 2001 to 2023 (or most recent year)**



Source: Australian Government (2022a, 2022b, 2023); CWTS Leiden University (2022)

**Figure 2. Proportion of all research expenditure, research income and Research Block Grants at Go8, 2001 to 2023 (or most recent year)**



Source: Australian Government (2022a, 2022b, 2023)

## Research output, impact and diversification

- Australia's 34 largest universities included in the Leiden Ranking (with at least 800 research outputs over a 4-year period)<sup>1</sup> more than doubled their publication output in the Web of Science over the past fifteen years, from 74,000 in the period 2006-2009 to 148,000 in the period 2017-2020.
- Australia's growth in research output has primarily been driven by universities outside the Go8, which increased output by 165% between the periods of 2006-2009 and 2017-2020, compared to a still impressive, but lower rate of 69% at the Go8.
- The broad and rapid growth across the entirety of the university sector means that Australia's research system is far less dependent on outputs from Go8 members. The Go8's share of Australia's research output declined from 66% in 2006-2009 to 56% in 2017-2020. This pattern is consistent across all fields of research. In 2006-2009, the Go8 published 75% of Australia's research in biomedical and health fields. By 2017-2020 this had declined to 63%, mirroring declines in physical sciences and engineering (from 66% to 54%), mathematics and information technology (from 60% to 48%), life and earth sciences (from 58% to 53%) and humanities and social sciences (from 56% to 47%).
- The growth outside the Go8 has not been due to an emphasis of "quantity over quality", at least in terms of citation impact. The dramatic increase in non-Go8 output has meant that the Go8's

<sup>1</sup> This includes all universities other than Southern Cross, CDU, Notre Dame, Federation, Torrens, Bond, Divinity.

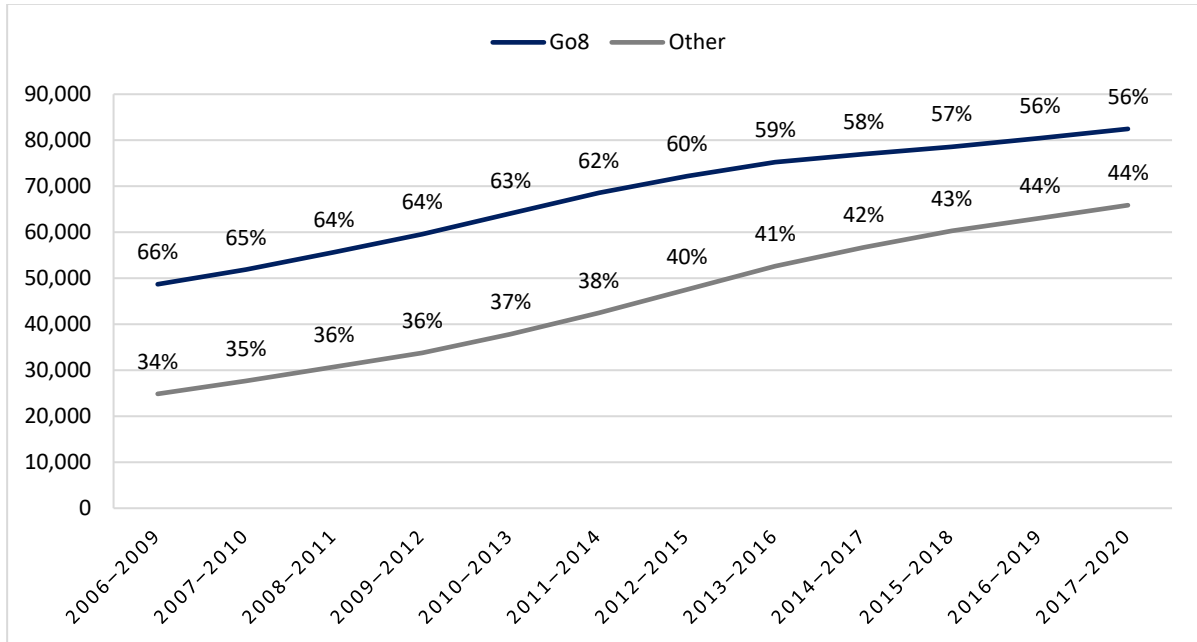
share of research that is the top-10% most cited in its field has declined from 73% in 2006-2009 to 57% in 2017-2020. For very highly cited research (top-1%) the declines have been equally dramatic (from 75% to 58%).

- Research in collaboration with industry and international partners has also disproportionately grown outside the Go8. The Go8 have declined in their share of industry collaborative research from 69% in 2006-2009 to 61% in 2017-2020, and international collaborative research from 68% to 56%.
- Whether in terms of publications per \$ of expenditure, income or research support (RBG), Go8 members publish fewer research outputs, highly cited outputs and collaborative outputs than their non-Go8 peers. For example, in 2017-2020 the Go8 members published 82,464 author fractionalized journal articles from a total \$29,115M in research expenditure and \$4,843M in RBG. This equates to \$353,000 in expenditure and \$59,000 in RBG per publication at the Go8. Non-Go8s had \$298,000 in expenditure and \$43,000 in RBG per publication, indicating a more efficient use of their more limited resources.
- The research expenditure per publication at Go8 members increased by 4% in nominal terms from 2006 to 2020, but non-Go8 universities reduced their expenditure per publication by 20% over this period. The additional costs at the Go8s may be due to the relatively higher cost research disciplines, projects or staff at Go8 members.
- Research publications per weighted academic research staff<sup>2</sup> increased from 0.7 publications in 2006-2009 to 1.2 in 2017-2020. This represents a research productivity increase of 73% across the sector, but again the greatest productivity growth has been outside the Go8, increasing by 109% compared to 57% at the Go8.
- Go8 members continue to publish more per staff member, 1.4 publications versus 1.1 publications, but the gap has progressively decreased from 62% more in 2006-2009 to 22% in 2017-2020. This possibly overestimates productivity at the Go8 due to the inclusion of publications from teaching-only staff, PhD candidates and honorary staff (who are not included in the denominator for staff inputs).

---

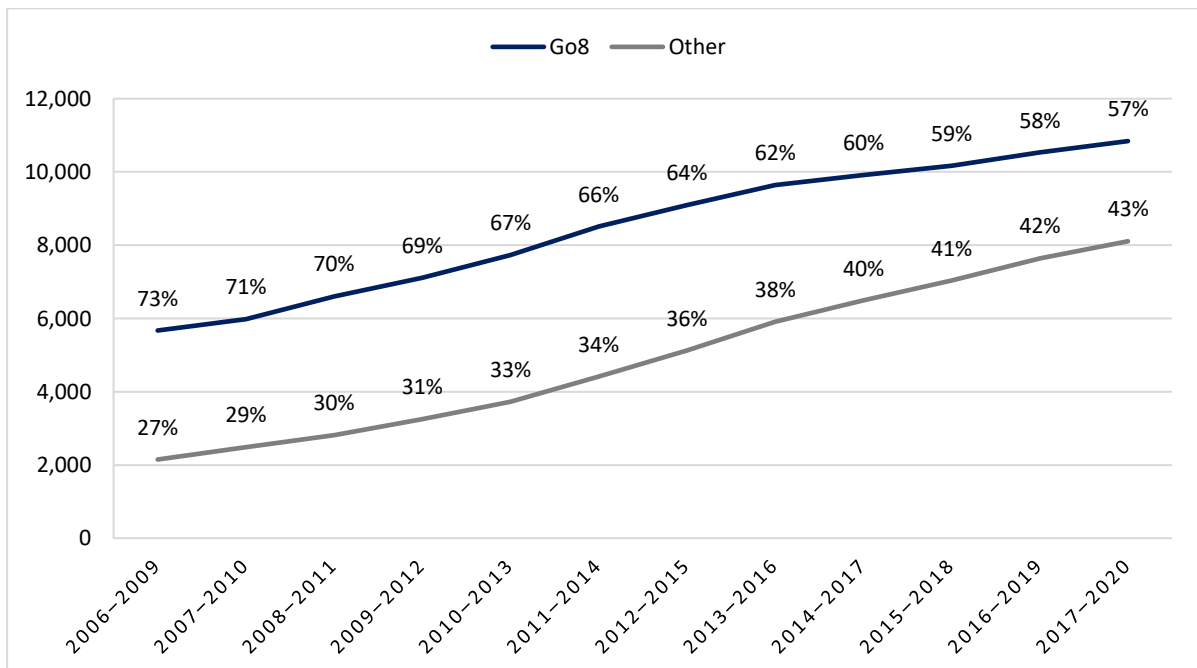
<sup>2</sup> Weighted for 100% workload for research-only and 50% workload for teaching and research staff.

**Figure 3. Publications in the Web of Science by Go8 (total and % of sector) vs others, 2006 to 2020**



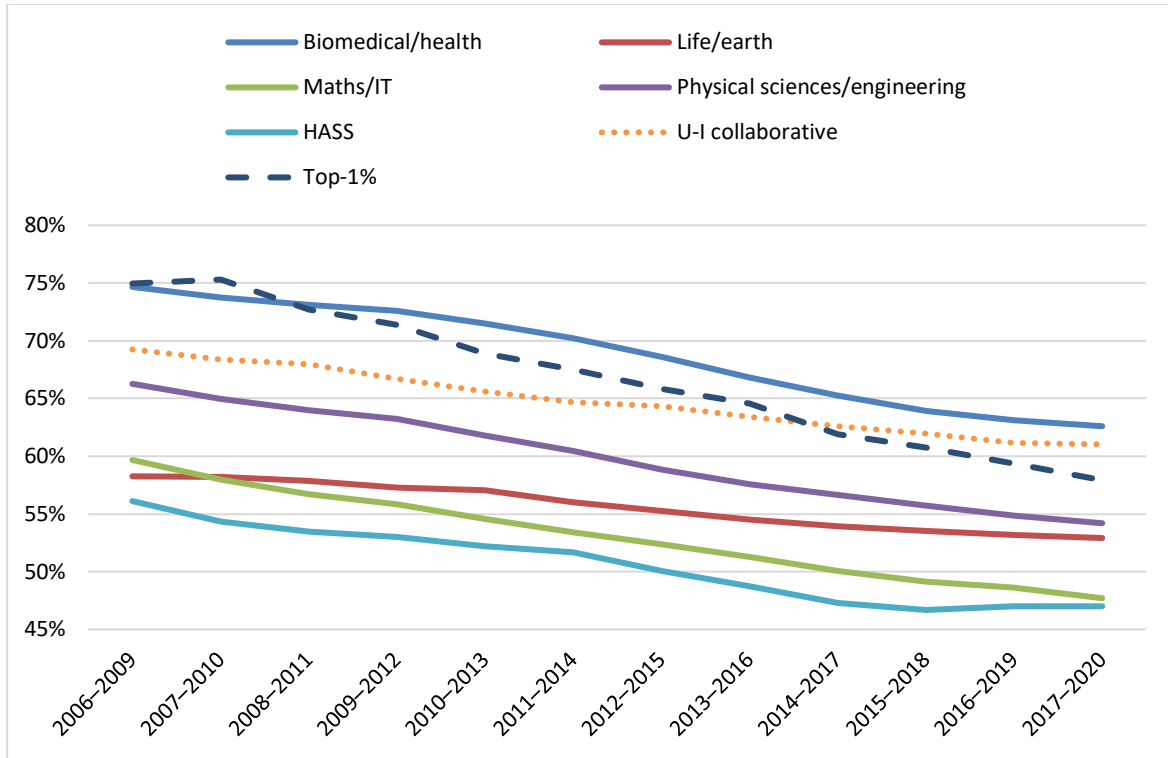
Source: CWTS Leiden University (2022)

**Figure 4. Highly cited (top-10%) publications in the Web of Science by Go8 (total and % of sector) vs others, 2006 to 2020**



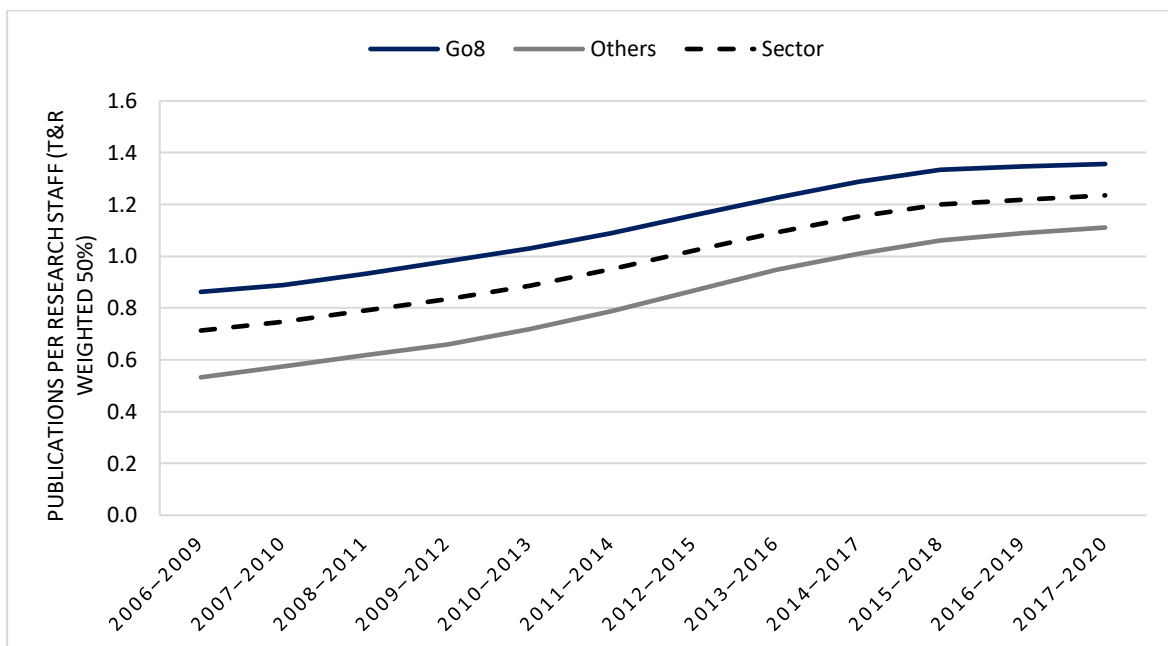
Source: CWTS Leiden University (2022)

Figure 5. Go8 share of Australia’s publications in the Web of Science by type, 2006 to 2020



Source: CWTS Leiden University (2022)

Figure 6. Publications in the Web of Science per weighted research staff at Go8 and others, 2006 to 2020



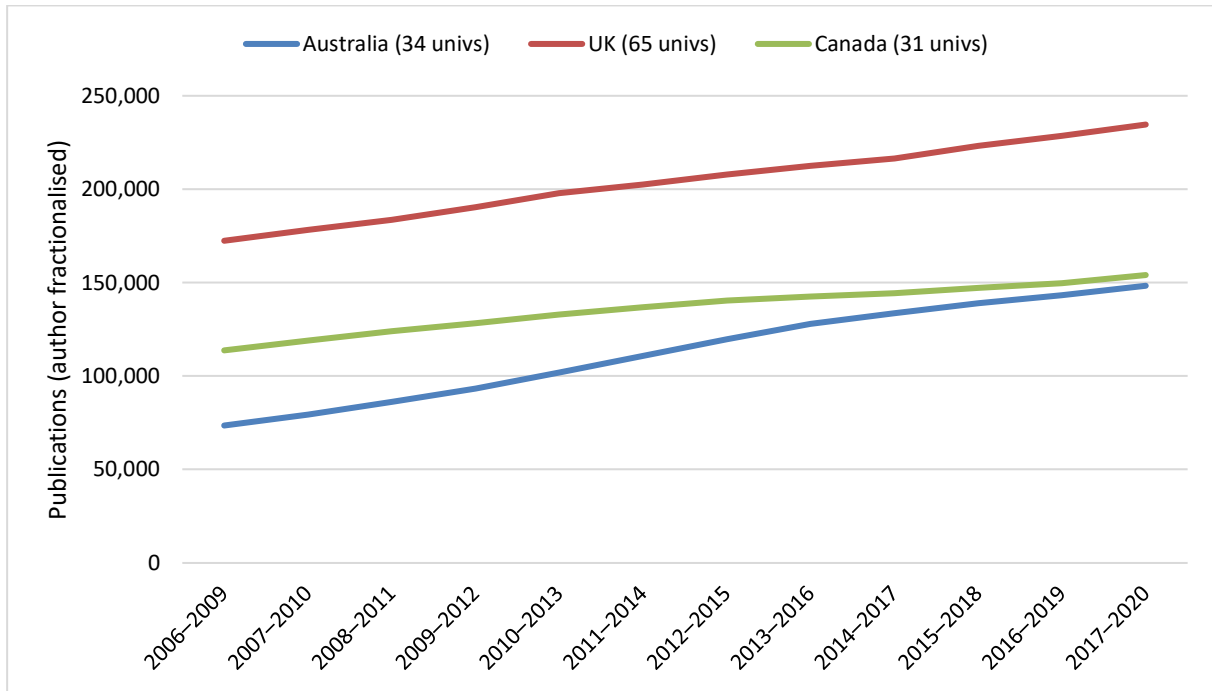
Source: Australian Government (2022c); CWTS Leiden University (2022)

## Australia's research concentration compared with Canada and the UK

- Australia's 34 largest research universities have dramatically outperformed their international peers in terms of publication output in the Web of Science over the last two decades. Australia's growth of 102% from 2006-2009 to 2017-2020 far outstripped growth in Canada's 31 largest universities (35% growth) and the UK's 65 largest universities (36%). Australia's 34 largest universities published 96% of the Canadian university output in 2017-2020, up from less than two thirds of their output in 2006-2009 (65%).
- Over this period, the UK and Canadian university systems maintained their concentration within the research-intensive universities. The Canadian Universities 15 group maintained their share of 80-81% of all research outputs across the 2006-2009 to 2017-2020 period. The UK's Russell Group has likewise maintained its share at 73% across the period. This concentration has likely contributed to their lagging performance relative to Australia.
- Another measure of research concentration is the Gini coefficient, which measures the extent to which the distribution of publications from within a country deviates from a perfectly equal distribution. A coefficient of 0 expresses perfect equality and 100 expresses full inequality. For example, Australia had 148,336 publications in the Web of Science in 2017-2020 across 34 universities. Perfect equality would mean each university published 4,363 publications (148,000/34), and perfect inequality would mean one university published all 148,336. It is important to recognise that the Gini Coefficient is a measure for research equality, rather than diversification. A highly unequal research system may also be highly diverse, with a mix of smaller and larger universities, of varying levels of research intensity.
- The Australian Gini Coefficient for Leiden output in 2006-2009 was 0.54 compared to 0.45 in 2017-2020, indicating an increasingly equal contribution of research output across the 34 universities. However, this underestimates the trend towards greater equality. The Leiden Ranking includes only larger research output universities with at least 800 publications across the 2017-2020 period. Australia had only 21 universities meeting this threshold in 2006-2009, but this increased to 34 in 2017-2020, comprising 79% of the 43 universities in the sector. The progressive addition of new, low output universities to current and past periods (not just the period when they met the threshold) will typically increase the Gini Coefficient for all periods because low output universities are farthest from the average.
- For the UK the Gini Coefficient decreased from 0.50 in 2006-2009 to 0.48 in 2017-2020, and for Canada from 0.48 to 0.46. Like Australia, this slightly underestimates the moderate trend towards equality due to the addition of new low output universities. For Canada there was a modest increase from 26 to 31 universities, and for the UK from 42 to 65. For Canada, the Leiden data includes only 31 of the 96 public universities (32%) and for the UK only 65 of the more than 160 universities (41%). Therefore, the Australian university sector, due to having relatively few low output universities and more of its universities in the Leiden Ranking, is considerably more equal than Canada and the UK, despite having a similar Gini Coefficient.

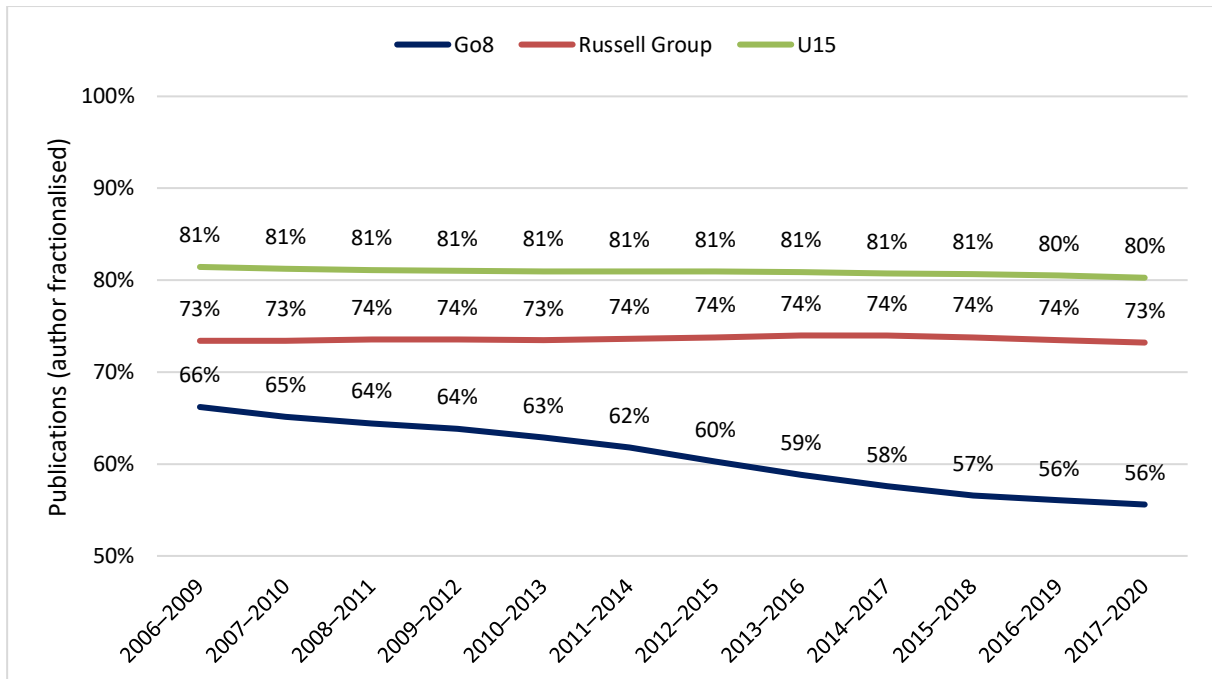


**Figure 7. Publications (author fractionalised) in the Web of Science by universities in Australia, Canada and UK, 2006 to 2020**



Source: CWTS Leiden University (2022)

**Figure 8. Proportion of country's publications by research intensive group, Australia, UK and Canada**



Source: CWTS Leiden University (2022)

## References

- Australian Government. (2022a). *Higher education expenditure on R&D by higher education provider*. <https://www.education.gov.au/research-block-grants/resources/higher-education-expenditure-rd-higher-education-provider>
- Australian Government. (2022b). *Research income time series*. <https://www.education.gov.au/research-block-grants/resources/research-income-time-series>
- Australian Government. (2022c). *Selected Higher Education Statistics – 2021 Staff data*. <https://www.education.gov.au/higher-education-statistics/staff-data/selected-higher-education-statistics-2021-staff-data>
- Australian Government. (2023). *Research Block Grants*. <https://www.education.gov.au/research-block-grants>
- CWTS Leiden University. (2022). *CWTS Leiden Ranking 2022*. <https://www.leidenranking.com/>