Improving output measures of Australian universities

Jason Annabel, UNNES sprint, 15 July 2026

AUSTRALIAN BUREAU OF STATISTICS
Informing Australia's important decisions

Broader context

- ABS received some limited funding to enhance measures of non-market activity (2019-2021ish)
- A number of deliverables:
  - A concepts paper
  - Improvements into measures of hospitals, schools and universities
  - ‘Proof of concept’ productivity growth measures for same three areas

Before and after

- University output measures in the Australian National Accounts: experimental estimates, 2008 to 2017 | Australian Bureau of Statistics
- Previous annual measure: annual output growth tracked using the raw change in student enrolments, measured on a full-time equivalent basis
- New annual measure: applies expenditure weights to enrolments (implicit quality change) alongside a direct measure of research output

Setting the scene

- 39 publicly owned universities in Australia, 5 private
- Significance: In 2016/17, services provided by technical, vocational and tertiary education institutions contributed 40% of education industry output and accounted for 25% of Australia's service exports
- Which institutional sector?
  - Economically significant prices?
  - Overseas students
- Which level of government?
  - Centre of economic interest?
- Types of universities?
  - Urban v regional
  - 'Traditional' v vocational
  - All covered by the same legislative framework and reporting standards

Economically significant prices

- Public universities brought into Australian macroeconomic statistics (GFS and national accounts) late 1990s
- Vast majority of places co-funded by government financial scheme (like student loans)
- On balance, considered to be non-market at time of introduction
- Arguably no longer the case: international and postgraduate students paying full fees, research partnerships with the corporate sector …
- Huge amount of co-ordination work to shift from general government to public corporations – rich data on fees/prices which we can't use

Level of government

- Predominantly funded by Commonwealth, legally owned by States/Territories
  - Australian National University the only exception: clearly Commonwealth
- Question of control – financial or legal?
  - Centre of economic interest argument in GFS manual
- Background – late 1990s – tightening and unifying public sector accounts – who 'owns' the universities in terms of financial reporting?
- GFS decision: "control not further defined"
  - National accounts: rolled in with Commonwealth level of government

Defining output: teaching

- Teaching output: student enrolment on FTE basis, weighted by operating cost for each individual university
- Intuition: cost differences implicitly convey information about the relative quality of universities: universities that spend more on each unit of teaching and/or research effectively produce higher quality outputs
- Non-award study and research-based degrees excluded from the teaching component

Teaching output: limitations

- Using enrolments as the quantity measure instead of degree completions means qualifications that take longer to complete carry higher weight.
- This also applies to students who take longer to complete their degrees (e.g. due to subject failures etc): A student who repeats a unit will be allocated a higher weight because they remain enrolled for longer than their counterparts who complete the degree without failure
  - This is because an academic who delivers a course to a student for a second time is producing additional output
- Ideally, a higher weight would be assigned to degrees that are more expensive to deliver: enrolments data by discipline are publicly available, but faculty-based expenditure data are not available
  - Is a degree in chemistry more ‘valuable’ or of higher ‘quality’ than one in history?

Defining output: research

- While research is a core function of universities, there is no clear definition of research output, which makes it hard to measure
- Two key components identified:
  - Research degree completions
  - Research funded externally (i.e. by government and the corporate sector)

Research degree completions

- The first component reflects the number of research degree completions per university
- Research degrees are either research doctorate (PhD) or research-based masters degree qualifications
- Doctoral degrees treated as equivalent to two research masters completions
- Aggregated across all universities using the research expenditure weights for each university in each year

Research funded externally

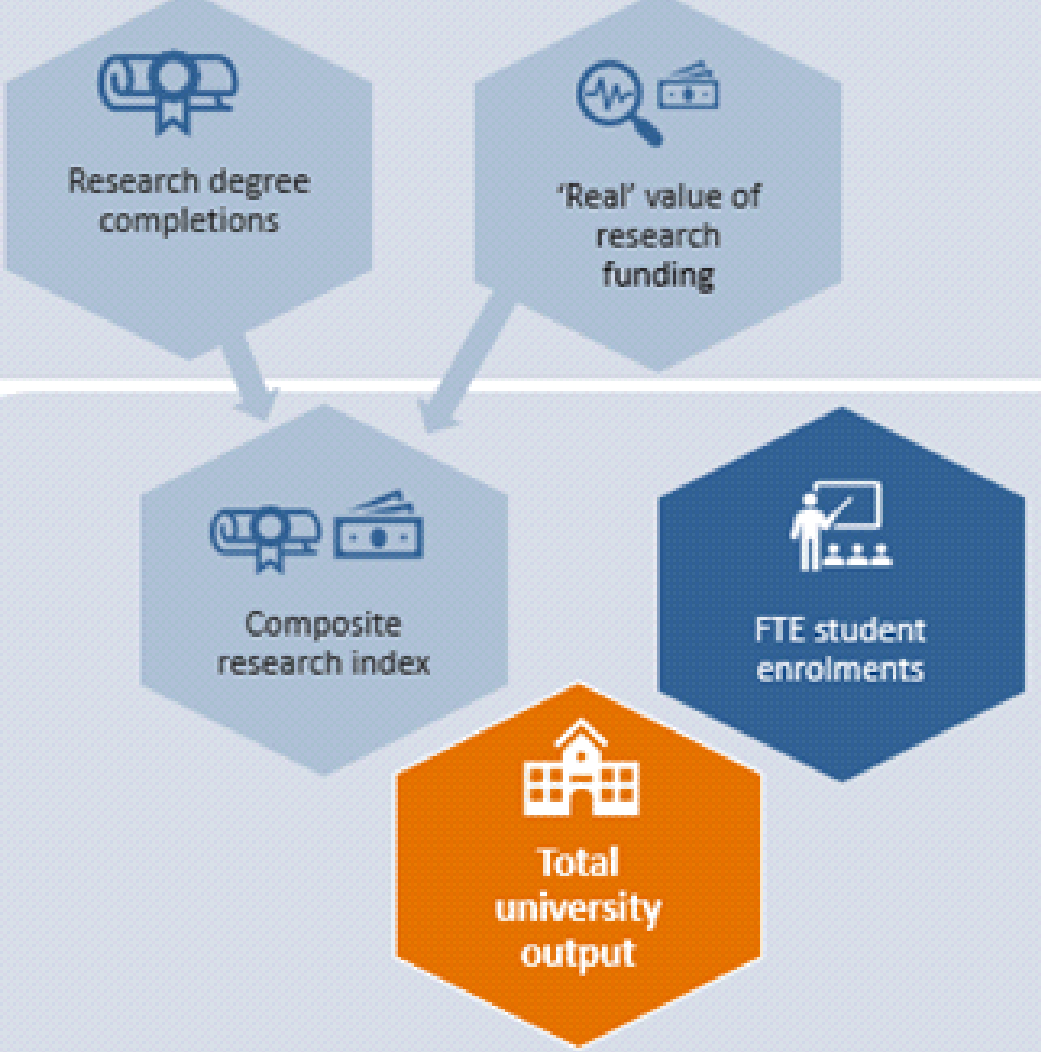
- The second component represents university research output funded by government and industry
- Research output often can't be observed/quantified, so proxied by research income received
- Assumption is that funding is typically tied to the production of knowledge in the form of reports and publications
- Research income is deflated by CPI and aggregated across all universities using the research expenditure weights for each university in each year
- Thought about measuring research by counts of research publications, but how to weight?
  - Papers, conferences, books, articles …

Weighting the two research components together

- Challenging due to changes in government funding policies over time
- Last change was 2017
- Research Support Program (RSP): Funds the systemic cost of university research not already supported through specific research projects, such as libraries, laboratories, consumables, and computing centres
  - 73%: weight used for research funded externally
- Research Training Program (RTP): Funds scholarships to support the training of students undertaking higher degrees by research
  - 27%: weight used for research degree completions
- Aggregation of the two components gives us a total index for research output

Weighting teaching and research

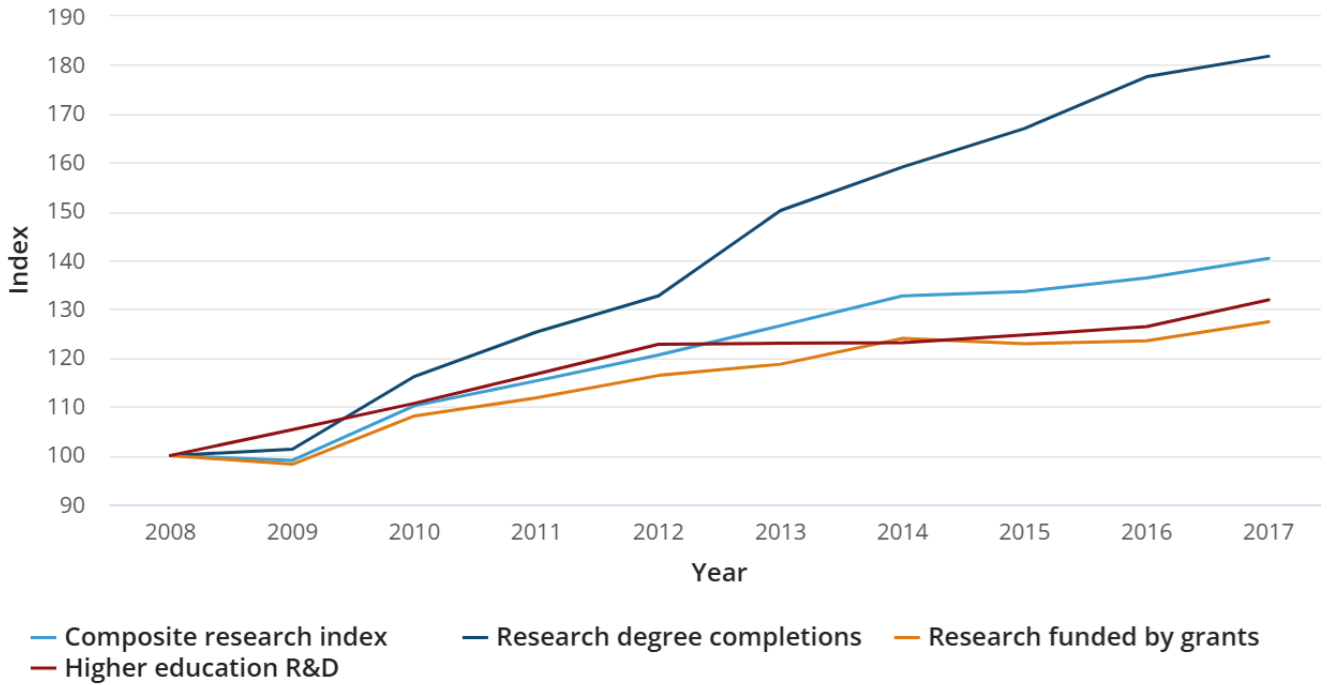
- Aim: split each university's operating expenditure into teaching and research
- Problems:
  - published expenditure data isn't split like this
  - there is overlap (i.e. some (most?) academics do both)
  - many staff employed by universities do neither (i.e. human resources, facilities maintenance etc)
- Arbitrary weights: teaching 75%, research 25%
  - Sensitivity tested – will come back to this
- Split based solely on labour input, for one class of employee
  - Contributions of capital and intermediate consumption towards teaching and research activities not attempted



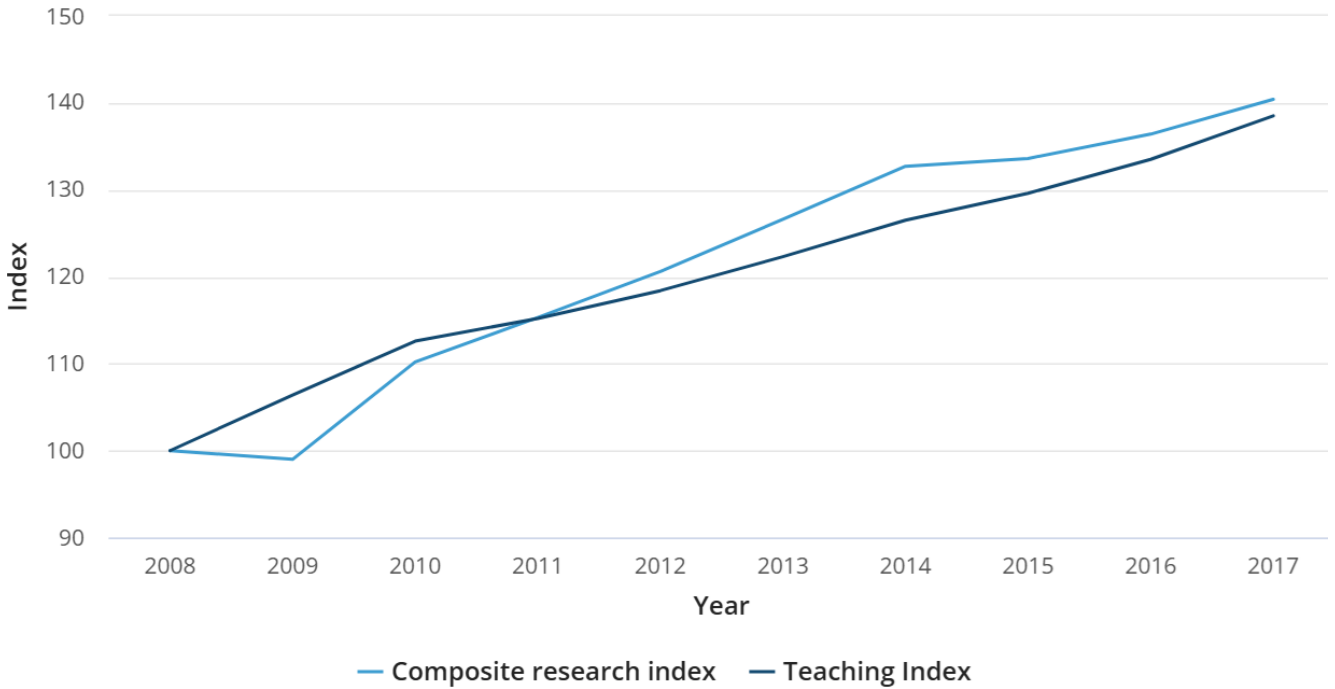
Expenditure-weighted research degree completions and the deflated value of research output funded by government and industry are aggregated to form a composite research index, using the weights θ_{comple} and θ_{teach}

The composite research index is then aggregated with a cost-weighted index measuring teaching output, using the weights $\omega^{t}_{teach,i}$ and $\omega^{t}_{research,i}$ to derive an index reflecting growth in total university output.

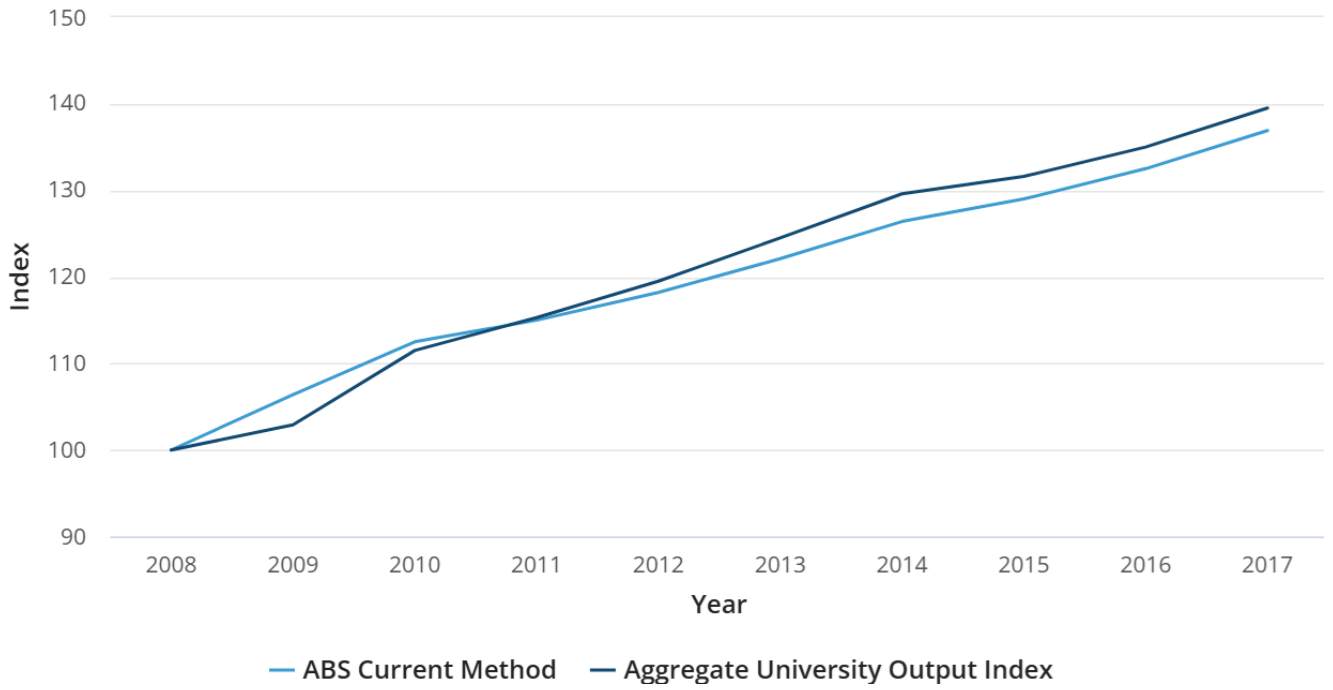
Components of research activity



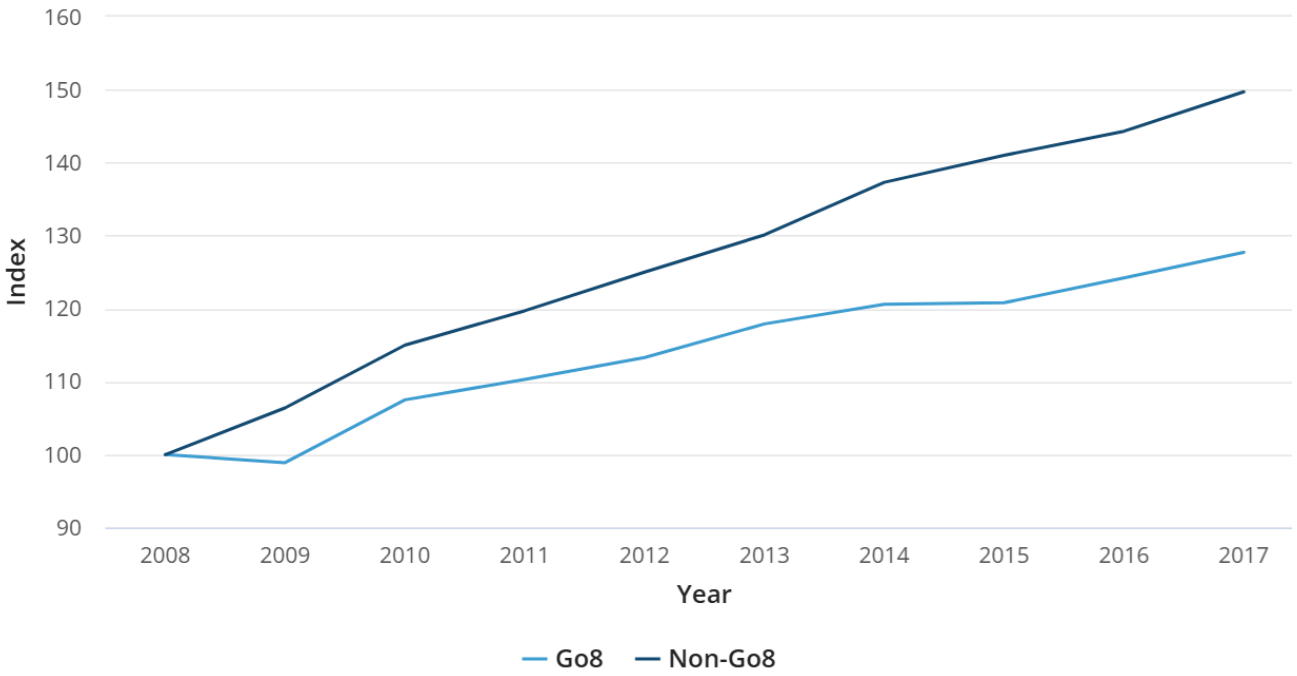
Teaching v research output



Aggregate output: old method v new



Go8 v non-Go8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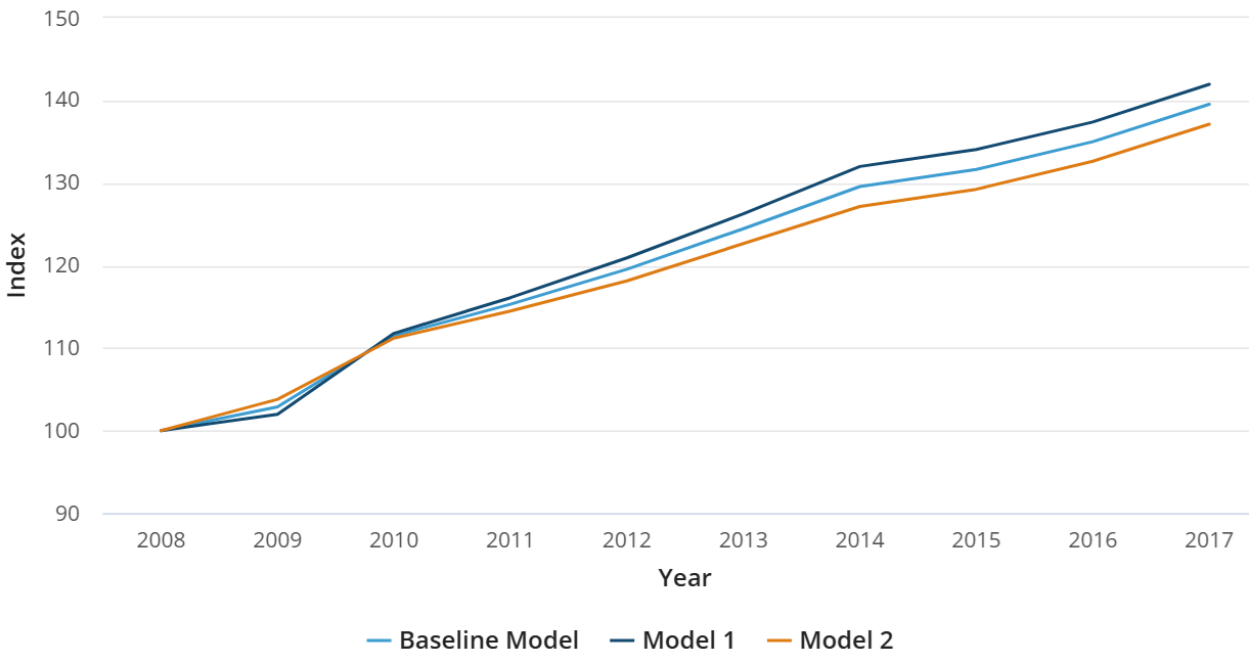
Teaching v research weights: sensitivity testing



Other things we thought about …

- Refinements to the relative weights of teaching versus research
- Stratifying teaching output data by discipline
- Use of price information
  - (international students pay full economic cost)
- Incorporating research publications within research output measures
- Incorporating university ranking data
- Incorporating post-graduate expected lifetime earnings
  - (quality adjustment by degree types)

Thanks!

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