Research Funding of Australian Universities: Are There Increasing Concentration?

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Abstract

Australia’s higher education sector is facing a watershed moment of its research funding regime. The Federal Government has proposed to change from the long-standing funding model that heavily based on publication output, to one based on publication plus industry engagement. In this paper, we take stock of how research funding is raised and allocated within the sector over the past two decades. It is found that the share of total research funding by university groups have barely changed. But the discipline of Biological and Clinical Sciences has increasingly dominated competitive funding schemes.

Keywords: Research funding, ARC, NHMRC

1 Introduction

Australia’s higher education sector is facing unprecedented challenges from both domestic and international fronts. In the past 20 years, the sector has experienced cuts in federal funding on a per student basis (Marginson 2001), a trend that puts pressure on Australian universities to increasingly rely on student fees. Australian universities are increasingly looking to overseas education markets as a source of funding. However, competition for international students has intensified rapidly with the entry of non-English speaking countries from Europe (e.g. France) and Asia (e.g. China) in additional to English speaking countries like the US and Singapore. What adds to this already complex environment is the spectacular rise of global university rankings in the past decade. These rankings are deemed a ‘consumer guide’ by international students or even public organizations (Hazelkorn 2007; HEFCE 2008), and they typically put overwhelming weights on research, especially The Academic Ranking of World Universities (commonly unknown as Shanghai Jiao Tong University ranking). Consequently, they have put huge pressure on universities worldwide to lift their game on research.

The total research funding allocated to Australian universities was about one-third of a percentage point of GDP in 2013 (see Table 2). As the Federal Government faces the challenges of budget repair, the funding pie is unlikely to get bigger – if not smaller – in the foreseeable future. Therefore, how the pie is distributed becomes even more critical for the future research performance of individual universities. In relation to that, certain segment of the tertiary sector has argued that due to the relatively small size of Australia in global research, the way to ensure Australia can punch above its weight is to channel scarce funding to the nation’s ‘best performers’ so that they can achieve the critical mass to be globally competitive (Dodd, 2015). Not surprisingly, sandstone universities are more supportive of this view while smaller and regional universities
disagree. However, little evidence has been produced to validate or invalidate the critical mass argument in the Australian context.\footnote{A recent study by Williams (2016) assesses Australia’s investment in R&D activities, research output and connectivity with industry from an international perspective. It concludes that the country is biased towards basic research, a fact that is driven by its reliance on international students’ tuition, which in turn implies its reliance on international rankings. The study suggests a diverse system, in which a group of institutions pursues excellence of international standards in basic research, and others focus more on applied studies involving local issues.}

Furthermore, the Federal Government recently announced changes to the funding model of Australian universities which will see less emphasis on publication and an increased weight of industrial engagement: ‘the new arrangements are designed to drive greater research-industry engagement by substantially boosting incentives for collaboration with business and organisations which use the outcomes of research’ (Department of Education and Training, 2016). Against this background, and considering the two decades from 1992 to 2013, the objective of this paper is to investigate:

(a) how much research funding the public and private sectors have contributed to the Australian higher education sector and how did it change over time;
(b) how funding has been distributed amongst universities and whether there is increasing or decreasing funding concentration over time; and
(c) how the competitive funding from the two major grant bodies, the Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC), has been distributed amongst disciplines and whether there is increasing or decreasing funding concentration over time.

To the best of our knowledge, these questions have not been answered before using the data in recent decades. A key contribution of this paper is the compilation of a panel data of research funding over two decades for all Australian universities. We collected and processed data from the Higher Education Research Data Collection (HERDC), ARC and NHMRC databases. A contribution of the paper is to reconcile the FOR2008 and RFCD1998 codes for research disciplines (see appendix for details), with which we calculate the amount of ARC or NHMRC research funding attributed to each discipline within each university each year. Most analyses on the allocation of ARC and NHMRC funding over disciplines amalgamate grants by commencement year. We instead look at annual allocations and update expected allocations with actual ones whenever possible. The data collection work is challenging because of the multiplicity of data sources and changing data collection methods by government agencies over time. We went through the funded projects one by one to correct any double- or mis-reporting.

Studies on research funding allocation amongst Australian universities are few and far in between. Abbott and Doucouliagos (2003) study technical and scale efficiency of Australian universities using Data Envelopment Analysis (DEA). Their study uses the number of equivalent full-time students (EFTS), the number of postgrad students and undergraduate degrees, and Research Quantum Allocation as measures of output, while input measures include the number of staff (academic and non-academic), expenditure on all inputs other than labour inputs, and the value of non-current assets as a proxy for capital stock. They find that Australia’s universities perform fairly evenly regarding efficiency. However, the study suffers from the same problem faced by other studies in the literature (including the current paper), which is its inability to capture output quality. Our
study does not assess university productivity. Instead, we focus on distributional movements of total research funding over time.

Another study, Ville et al. (2006), focuses on the distributional movements of major input and output measures compiled by HERDC using calculated Gini coefficients. However, their study covers the period from 1992 to 2003, excluding block grants and detailed breakdowns of Commonwealth competitive income into ARC, NHMRC, and other schemes as well as their discipline components. Their study points to a gradual convergence pattern in output by Go8 and smaller universities, but continuing uneven distribution in funding between the two groups from 1992 to 2003. Our analysis from 2001 to 2013 reveals similar patterns.

The rest of the paper is organized as follows. Section 2 describes the data used in the analysis. Section 3 presents a descriptive summary of the distribution of funding by sources. Section 4 examines the allocation of funding across university groups, within each of these groups and finally across all universities. The paper concludes with a brief discussion on the implications of our study and a summary of its key findings.

2 Data
Since all the funding data used in this paper are about researching funding, in what follows we use the term ‘funding’ for brevity. We compile the data from four main sources: the Higher Education Research Data Collection (HERDC) from the Department of Education and Training (DET), the National Competitive Grants Program Dataset (NCGP), the Research Management Database of the National Health and Medical Research Council (NHMRC), and the DET’s document on Research Block Grant (RBG) allocations. Details of these datasets are provided in the appendix.

Figure 1 provides a schematic presentation of the composition of research funding for Australian universities. The total research funding makes up of three main components: Competitive Income, RBG, and Other Income. Two main subcomponents of Competitive Income are Australia Research Council (ARC) grants and NHMRC grants. Our record of ARC grants only includes those commencing no earlier than 2002, and NHMRC grants include those commencing no earlier than 1990. This means that analyses of annual funding flows in levels will downwardly bias funding amounts in early years of the period, and in addition inflationary effects would need to be accounted for. To reduce the former bias and casts aside the latter issue we use shares of funding.

The dataset covers 39 universities out of 41 universities listed as HEPs under the Higher Education Support Act 2003.² Figures for University of Notre Dame Australia are only available for years since 2008. This has negligible effect on the analyses of funding allocation by university group because this university’s share in total research funding is very small. To make the analytical results easier to comprehend, we group similar universities together as a unit. Since universities are heterogeneous in many aspects, there is no single way to group them. Therefore, we adopt the grouping chosen by universities them. A number of Australian universities with similarity in size, history and orientation have formed their own groups and use them as platform to pursue issues of their interests. They include the Australian Technology Network (ATN), the Group of Eight (Go8), and the Innovation

² The Bachelor Institute of Indigenous Tertiary Education and MCD University of Divinity are excluded because of inconsistent record by HERDC. Australian Maritime College, which was merged to the University of Tasmania in 2008 is also excluded.
Research Universities (IRU). Their composition is shown in Table 1. We group the rest as the ‘Other’. Go8 universities are known as the ‘sandstone’ universities, as they tend to be the oldest and largest. They are also more research oriented in general and, as a result, tend to dominate research funding allocation.

3 Distribution of Funding by Source

In this section, we look at the distribution of funding by source; in the next section, we look at the distribution by university.

Figure 1 shows the amount and share of funding received by Australian universities by sources as in 2013. It can be seen from the middle layer of the chart that, Competitive Income, RGB, and Other Sources are of roughly comparable magnitudes. As shown in the bottom layer of the chart that, ARC and NHMRC grants together make up the bulk of the competitive grants: 46% and 37% respectively. Within the Other Sources category, Other Public Income and Industry and Other Income (e.g. contracts, donations, bequests) make up 44% and 48% respectively.

Figure 2 shows the share of funding received by different university groups in 2013. ATN’s funding sources are most diverse, while Go8’s are least diverse. Groups with less diverse funding sources are potentially more vulnerable to changes in individual grant categories. Half of Go8’s research funding is from ARC, NHMRC or similar competitive sources, while only a third of ATN’s funding is from these sources. Moreover, although CRC remains a small portion of total funding, its share in ATN’s total funding is much higher compared to those of the other groups, probably reflecting the former’s focus on applied research.

Figure 3 shows the allocation of each funding by university group in 2013. Although Go8 dominates every funding category at the bottom level of the chart, its share is particularly large for the ARC and NHMRC ones. ATN performs best in the CRC category, and IRU does well in the Other ACGR Schemes category; but these two categories are relatively small in absolute dollar terms.

4 Allocation of Funding by University

The last section presents the funding allocation of a single year; in this section, we look at how the allocation changes over time. The focus is on whether there is any sign of resource concentration across as well as within university groups.

Table 2 expands the data of Figure 1 back to 1992, and expresses it as a share of nominal GDP. For some categories, data are not available in earlier years. Therefore, we only do the sum if data for all components of the data are available to avoid inconsistent and potentially misleading results. This is the reason Total Funding figures are not reported till 2001, for instance.

Over the years, funding grew in some categories and declined in others. From 2004 to 2013, Competitive Income and Other Source increased by 32% and 24% respectively, while RBG decreased by 13% (all in terms of share of GDP, not absolute dollars). The main driver of funding

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growth from Other Sources is the growth in Other Public Income (63%). In contrast, CRC funding decreased by 47.24%. Within Competitive Income, ARC funding grew much less rapidly compared to NHMRC funding, with increases of 23% and 47% respectively over the ten-year period.

### 4.1 Allocation of Funding across University Groups

Figure 4 shows the share of the total funding by university groups from 2001 to 2013. During this period, the share of Go8 increased slightly by 2.5 percentage points from 64.6% to 67.1%, and that of ATN increased by 0.9 percentage point from 8.5% to 9.4%. On the contrary, the share of IRU declined by 1.9 percentage points from 12.5% to 10.6%, and that of Others also declined by 1.5 percentage points from 14.4% to 12.9%.

A breakdown of the funding by sub-category shows that the increase in the total funding share by Go8 during this period came largely from its rising shares of Competitive Income (from 70.8% to 73.0%) and RGB (from 61.8% to 64.5%); its share of Other Sources increased only marginally in comparison (from 64.0% to 64.1%). For ATN, its expansion spread quite equally across the three sources: from 4.8% to 6.6% for Competitive Income, from 8.9% to 9.8% for RGB, and from 10.5% to 11.5% for Other Sources.

Amongst all types of research income, the competition for ARC and NHMRC funding tend to attract most attention within the section. This is because they make up the bulk of competitive funding, which further feeds into the calculation of RBG allocation, and so having the effect of double-dipping. Furthermore, because of their assessment methods heavily rely on peer review, ARC and NHMRC are perceived to be a much stronger indicator of research excellence in the conventional sense than other types of funding. Therefore, we look at the shares of these two sources of funding in more details.

Figure 5 shows the share of ARC funding by university group over 2002-2013. The share of Go8 in ARC grants has a significant gain of 7.7 percentage points – from 65.2% to 72.9%. As a result, all other three groups suffered a loss of funding share. However, the drop of IRU was particular big of 4.4 percentage points – from 12.8% to 8.4%. The decline in funding shares by ATN and Others were 1 percentage point (from 7.7% to 6.7%) and 2.2 percentage points (from 14.3% to 12.1%) respectively.

Data for NHMRC grants is available for a much longer period, from 1992 to 2013, and the results are shown in Figure 6. Interesting, unlike ARC funding, the share of Go8 in NHMRC funding was essentially static at around 83.5%. This finding is even more striking given ANU was not allowed to participate in NHMRC (or ARC) grant competition prior to year 2000. Over these two decades, the biggest gain was experienced by ATN: an over three percentage points increase in funding share from 0.9% to 4.2%. Others’ share was more than double from 2.3% to 5.1%. On the contrary, IRU suffered a big loss; its share was almost halved from 13.3% to 7.1%.

### 4.2 Allocation of Funding within University Groups

In this sub-section, we examine the allocation of funding within each university group. To that end, we calculate the coefficient of variation of funding within each group. Coefficient of variation (CV) is equal to the standard deviation divided by the mean, and a commonly used measure of dispersion. A larger CV means that funding is distributed less equally within the group. Because the measure is normalized by the mean, we can compare the values across groups.
Figure 7 shows the CV of Total Funding by university group over 2001-2013. Total Funding within ATN, Go8 and IRU is much less disperse compared to that within the Other, which had consistent CV figures of around 0.9-1.0 throughout the period. This reflects the fact that the Other is less homogeneous than the three major groups. Among the three major groups, there appears to be a slight pattern of convergence in funding dispersion. While the CV of ATN increased from 0.13 in 2001 to 0.27 in 2013, that of Go8 decreased from 0.33 to 0.27, and that of IRU decreased from 0.40 to 0.25 over the same period. Compared to the figures for ARC and NHMRC funding in the following discussion, these figures and variations are however negligible.

Again, we look at ARC and NHMRC funding more closely. Figure 8 shows the CV of ARC funding by university group from 2002 to 2013. By and large there are little changes of CV over time. If anything, the CV of Go8 reduced from 0.34 to 0.28 over the period. Likewise, Figure 9 shows the CV for NHMRC funding by university group over 2002-2013. Comparing to ARC funding, there are lot more dynamics in the NHMRC funding allocation within each group. The CV of Others reduces from 1.93 to 1.39 over the period, and that of IRU from 1.40 to 0.88, meaning an increase in equality of funding distribution within each of these two groups. The distribution of funding becomes less equal within ATN, with its CV increased from 0.85 to 1.02. These strong within group inequality dynamics could be due to the fact that Go8 universities had a lion share of NHMRC funding (see Figure 4), and so an occasional success by non-Go8 universities in the NHMRC scheme could trigger in a big change in distribution within Go8. We do not observe the same situation in ARC even when Go8 also dominates there (but to a less extent). This is probably because ARC covers a much broader spectrum of disciplines than NHMRC and so it is easier for a university to smooth out the funding incomes across all its disciplines under ARC.

Last, Figure 10 shows the CV of funding across all universities, not just within university groups. The variation of Total Funding across all universities increased over the sample period, as the rising variation in Competitive Income and RGB overwhelmed the decline variation in Other Sources.

5 Allocation of ARC and NHMRC Funding by Discipline

In this section, we shift the focus from university groups to disciplines, which has never been investigated before. The analysis is limited to ARC and NHMRC only due to the availability of data.

Figure 11 shows that between 2002 and 2013 there appeared to be a shift in ARC funding from natural sciences, including Physical, Chemical and Earth Science (PCE), Engineering and Environmental Science (EE) and Biological and Biotechnological Sciences (BB), towards other disciplines. The share of PCE exhibits most variation, declining significantly from 29% to 19% over the first eight years before the recent recovery to 22%. Furthermore, EE and BB each has lost about three percentage points in the share of ARC funding. In contrast, a steady increase of similar magnitude in shares of ARC funding was enjoyed by Humanities and Creative Arts (HCA), Social, Behavioural and Economics Sciences (SBE) and Biomedical and Clinical Health Sciences (BCH). However, the bulk of funding for BCH and Public and Allied Health Sciences (PAHS) comes from NHMRC instead of ARC. In order to gain a more comprehensive picture we need to consider both funding sources.
Figure 12 shows the variation in each discipline’s share in the combined pie of ARC and NHMRC funding. William (2016) finds that Australia’s higher education sector maintains relatively weak connectivity with the industry, in comparison to countries with good research policies or high level of technological advances. The study points out that engineering and technology take up a relatively small share of research expenditure\(^5\) by Australian higher education institutions. This is in stark contrast with expenditure on medical research, where Australia only comes second after Sweden. The situation manifests itself in Figure 12. Shares of funding on medical research are predominant and rising fast. The share of funding by BCH increased significantly from 26% to 30%, leaving a gap of 15 percentage points by 2013 to the next predominant discipline - BB. A similar rise can be seen in PAHS, with 8% and 11% in 2002 and 2013 respectively. Shares of funding on engineering and technology decreased steadily over the period. However, future changes to the funding scheme with emphasises on innovation and application of research may break this pattern.

6 Conclusion
In this paper, we have compiled the data of research funding for Australian universities between 2001 and 2013. Although the underlying data are publicly available, different sources are not necessary consistent and, in some cases, even data from the same source are inconsistent over time. Therefore, the compilation of this dataset is in itself a contribution to the discipline as the dataset should prove useful for future research in this area.

In this paper, we have provided a comprehensive though basic analysis of the data. We have examined the distribution of funding by sources, university groups and disciplines over time. One striking result is that, over 13 years, the shares of total research funding by the four university groups have barely changed, though the changes of individual funding categories such as competitive grant and industry funding are slightly bigger. Changes in funding distribution within each of the four university groups over time are also limited, with the exception of NHMRC funding. Our analysis revealed that, at least for ARC and NHMRC funding, the dynamics lied with disciplines, not universities. Biological and Clinical Sciences has increasingly dominated the two competitive grant schemes, absorbing up to 30% of the funding in 2013, while these two schemes together accounted for more than a quarter (26.4%) of the total research funding to universities in the year.

Amongst the four university groups, Go8 rely particularly heavily on competitive grants. This is not surprising given these types of grants require investigators with track records based on quality based traditional research output such as publications rather than, say, social impacts. As such, Go8 universities could be more vulnerable than their counterparts to changes in competitive grant allocation criteria away from publications in high ranked journals.

7 References


Appendix

The HERDC dataset – provides data on Competitive Income, Other Public Income, Industry and Other Income, Cooperative Research Centre (CRC) Income. Competitive Income consists of income from research schemes and programs registered on the annual Australian Competitive Grants Register (ACGR). Other Public Income includes income from the Australian Government not eligible for inclusion in Competitive Income; income from State or Territory Government; income from local government; income from government business enterprises that are publicly owned or funded, either wholly or partly; CRCs Income where the reporting higher education provider (HEP) is not specified as either ‘The Researcher’ or ‘Participant’ in the Commonwealth Agreement. Industry and Other Research Income includes contracts, grants, donations, bequests and foundations from Australian industry or non-government agencies; HDR fees for non-Commonwealth supported domestic students; competitive, peer-reviewed research grant income from non-Australian agencies; other income from non-Australian agencies; HDR fees for non-Commonwealth supported international students. CRC Income includes income from a CRC where the reporting HEP is a core participant. It is important to note that CRC Income is reported by the latest financial year while income from other sources is reported by the latest calendar year.\(^\text{10}\) We use the compiled time series (from 1992 to 2013) maintained by Universities Australia.\(^\text{11}\)

Together with RBG, these four sources of income make up Total Research Funding as used in the analysis of returns to scale in section 6 of the paper. The two ‘return’ variables, weighted publications and HDR completions, are derived from the HERDC dataset. As we only use the 2001-2013 time series of Total Research Funding for consistency, we only need data on weighted publications from 2001 onwards. During this period, weighted publications consistently cover four main categories: books, book chapters, conference papers, and journal articles (with a weight of five given to books). Our HDR completion variable is calculated as a weighted sum of the number of masters and the number of PhDs, giving weights of 0.5 and 1 respectively to the two components.

The RBG dataset – is downloaded from the Department of Education and Training (DET) website. RBG figures are only available from 2001\(^\text{12}\) onwards. The figures are initial allocations, and component programs may change from year to year. Due to the narrow period of availability of RBG data, we only use 2001-2013 time series of Total Research Funding. Furthermore, the structural break in 2000, in which ANU started to compete for research income, and the inconsistent record of CRC Income before and after 2000 deem narrowing the time series to 2001-2013 necessary.

The NCGP dataset\(^\text{13}\) – provides data on research grants by the Australian Research Council (ARC) from 2002 onwards, with specified annual allocations of each and every grant. Our main ARC figures are the total ARC funding annually allocated to each university. In section 5, we look into the allocation of ARC funding across disciplines. To this end, we use the discipline clusters specified in

\(^{10}\) HERDC specification may change slightly from year to year. The description given relies on 2015 specification.

\(^{11}\) The dataset can be found at https://www.universitiesaustralia.edu.au/australias-universities/key-facts-and-data/Research-Intensity---Output/Research-Intensity---Output#.Ve67nkvfwJ.

\(^{12}\) The current suite of RBG was established in 2001 to replace the previous research quantum and research related programs, comprehensive records of which are not held by the DET.

\(^{13}\) The original datasets are downloadable from http://www.arc.gov.au/grants-dataset.
the 2010 Excellence Research Australia (ERA) Evaluation employed by the Federal Government. ‘Disciplines’ are determined by the four-digit Fields of Research (FOR) code as identified in the Australian and New Zealand Standard Research Classification (ANZSRC 2008).

An important contribution of our paper is in reconciling the 2008 FOR system with its predecessor, the 1998 Research Fields, Courses and Disciplines (RFCD) classification system. For this purpose, we utilise the one-to-multiple map between RFCD codes and FOR codes that can be found in the ANZSRC correspondence tables. Together with information on the proportion of each project’s research content attributable to each of the component RFCD/FOR code, the map helps consistently identify the proportion of funding taken up by each FOR code. We subsequently calculate the amalgamated ARC fund within each discipline cluster to each university each year.

The NHMRC dataset – provides data on research grants by the National Health and Research Council. The method of compilation is similar to that of the NCGP dataset. The only difference is that data on the percentage contributed by each RFCD/FOR code to each project is not available in the NHMRC dataset. We thus have to attribute the entire funding of a project to its main discipline, a compromise that may slightly bias the already predominant clusters – Biomedical and Clinical Health Sciences (BCH) and Public Allied Health Sciences (PAHS). However, since we are most concerned with variations over time of the allocation, this bias should be small. Finally, grants allocated to projects without specified research discipline is classified as ‘unspecified’, and those for infrastructure are classified as ‘infrastructure’.

14 For example, if an RFCD code corresponds to two FOR codes, the ARC fund allocated to that particular RFCD code is broken into two equal amounts assigned to each of these FOR codes.

Figure 1: Research funding by source, 2013

Total Funding ($5291m)

- Competitive Income ($1680m; 31.75% of total)
  - ARC ($770m; 14.55% of total)
  - NHMRC ($625m; 11.87% of total)
- RBG ($1670m; 31.56% of total)
- Other ACGR Schemes* ($285m; 5.39% of total)
- Other Income ($1941m; 36.68% of total)
  - Other Public Sources ($845m; 15.97% of total)
  - Industry and Other Sources ($922m; 17.43% of total)
  - CRCs ($104m; 1.97% of total)

* Figures for 'Other ACGR Schemes' is computed as the residual of the Competitive Income subtracting ARC and NHMRC grants.
Figure 2: Funding source by university groups

Reference year: 2013

Figure 3: Funding allocation by university groups
Reference year: 2013
Figure 4

Share of Total Funding by university group over time

Figures 5
Figure 6

Share of NHMRC by university group over time

Figure 7
Figure 8

Coefficient of variation of ARC funding by university group

Figure 9
Figure 12

Share of combined ARC and NHMRC funding by discipline

- Physical, Chemical and Earth Sciences (PCE)
- Humanities and Creative Arts (HCA)
- Engineering and Environmental Sciences (EES)
- Social, Behavioural and Economic Sciences (SBS)
- Mathematics, Information and Computing Sciences (MICS)
- Biological and Biotechnological Sciences (BBS)
- Biomedical and Clinical Health Sciences (BCHS)
- Public and Allied Health Sciences (PAHS)
- Infrastructure (NHMRC)
- Unspecified
Table 1: University Groups

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<td>Charles Darwin University, Flinders University, Griffith University, James Cook University, La Trobe University, Murdoch University, University of Newcastle.</td>
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<tr>
<td>Other</td>
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*a: The University of Newcastle left IRU in December 2014. In our study, group member status is taken as in year 2013.*
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<tr>
<td>Average annual change from the first data year to 2013</td>
<td>1.28%</td>
<td>2.61%</td>
<td>-1.55%</td>
<td>2.77%</td>
<td>2.33%</td>
<td>5.64%</td>
<td>2.81%</td>
<td>5.95%</td>
<td>4.29%</td>
<td>-4.32%</td>
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<tr>
<td>Change from 2004 to 2013</td>
<td>11.24%</td>
<td>31.83%</td>
<td>-12.68%</td>
<td>23.82%</td>
<td>23.08%</td>
<td>46.55%</td>
<td>28.28%</td>
<td>62.69%</td>
<td>16.02%</td>
<td>-47.24%</td>
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</table>

Note: Data for B, C, D1, D2 and D3 is obtained from HERDC dataset as described in section 2. Data for B1 and B2 is compiled separately from the ARC and NHMRC datasets respectively. Data on nominal GDP is collected from the Australian Bureau of Statistics, 5206.0 Australian
National Accounts. The data in absolute terms for ARC and NHMRC may be downwardly biased in the beginning years of the corresponding datasets, due to the fact that grants are recorded by commencement year. However, since the majority of ARC grants span a period of three years or less, we exclude only data points in the first two years of the corresponding dataset. NHMRC dataset starts from 1990, however we also exclude the data points in 1992 and 1993 of this dataset, due to the longer span of NHMRC grants compared to those ARC ones. For analyses on the shares of funding, we however keep the entire datasets, assuming that this sort of bias affects all universities and disciplines equally.