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Approaches to funding research and development



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Key issues

- Research and development (R&D) is an inherently uncertain endeavour. This can make it difficult for R&D, particularly basic research, to attract significant private sector funding. Government funding may ensure sufficient R&D is undertaken to support an advanced economy and drive solutions to social problems.
- Governments fund research in different ways. Liberal, 'bottom-up' approaches maximise the freedom of academics to set their own research agendas; this tends to favour basic research.
- In contrast, planned, 'top-down' approaches target funding at strategic priorities. This tends to favour the support of applied research and may prioritise industry engagement and technological development.
- Competition has increasingly become a fundamental principle in the allocation of funding. Competitive grants processes are designed to increase transparency and improve research quality.
- There is ongoing debate on the appropriate balance between basic and applied research; the development and commercialisation of research outcomes; whether the costs associated with competitive grant processes are justified; and the extent and form of government support for R&D.

Contents

Introduction	4
The rationale for government-funded R&D	4
Approaches to R&D funding	5
Funding instruments	6
Block grants	6
Competitive grants	6
Collaborative research infrastructure	6
Tax incentives	7
Mission-oriented innovation policies	7
Public research organisations	7
Considerations in funding R&D	7
The role of competition in research funding.....	7
Prioritising purpose or curiosity	8
Further reading	9

Introduction

Research and development (R&D) is associated with [increased productivity](#) and [economic growth](#). It contributes to innovation and drives quality-of-life improvements through advances in areas such as healthcare and environmental sustainability. A functioning R&D sector is typically seen as an essential component of any advanced economy.

This article focuses on government approaches to funding R&D, rather than the amount of funding provided. It discusses the diverse approaches to funding R&D and how they affect the activities that are undertaken.

What is R&D?

The OECD [defines R&D](#) as ‘creative and systematic work undertaken in order to increase the stock of knowledge ... and to devise new applications of available knowledge’ (p. 28). It covers 3 types of activity:

- **basic research**, which is ‘experimental or theoretical work undertaken primarily to acquire new knowledge ... without any particular application or use in view’
- **applied research**, which also aims to acquire new knowledge but with a ‘specific, practical aim or objective’
- **experimental development**, which draws on existing research to produce or improve products and processes (p. 29).

The rationale for government-funded R&D

R&D involves significant uncertainty, making success unpredictable. Even when R&D produces valuable outcomes, it can be difficult for an investor to capture all benefits from the research (such as through the protection of intellectual property), as the ideas generated [tend to spread, creating knowledge spillovers](#). This can make R&D a risky investment for the private sector. Although spillovers can be detrimental to individual firms, the spread of knowledge is [beneficial from a public policy perspective](#). This strengthens the case for governments to invest in R&D to drive innovation and support economic growth.

Strategic Examination of Research and Development

The Australian Government has commissioned an independent investigation into the state of Australia’s R&D system – the [Strategic Examination of Research and Development](#) (SERD). The SERD will find ways to [increase the value of government investment in research](#), grow business investment in R&D, and [align R&D spending with national priorities](#). The SERD report with recommendations was [delivered to government](#) in December 2025.

Approaches to R&D funding

It is widely accepted that government should have a role in supporting R&D. There is less agreement, however, regarding *what* R&D should be supported and *how* it should be supported.

For some, the advancement of science requires [scholars being free from any responsibility](#) beyond the search for knowledge [and the integrity of their research](#) (p. 6). Others argue for a [planned approach to science](#) to maximise its contribution to social welfare. [Alemán-Díaz describes these 2 perspectives](#) as the ‘curiosity motivation’, which values the pursuit of knowledge for its own sake, and the ‘purpose motivation’ which sees the intent of research as supporting the achievement of social or economic objectives (pp. 40–43).

These motivations are reflected in the choice of policy instruments used to support R&D. The curiosity motivation is associated with ‘bottom-up’ policies, which provides [‘freedom to researchers and research groups to set their own research agenda’](#) (p. 2). The purpose motivation, by contrast, is more associated with ‘top-down’ policies where funds are [‘earmarked by funding agencies for specific research projects’](#) (p. 2).

These motivations [reflect more liberal or more interventionist approaches](#) to governance. Not surprisingly, especially during the early years of the Cold War, funding debates were often [considered in the light of a nation’s broader ideological position](#). While the relative influence of these 2 motivations has shifted over time, funding systems have also been increasingly shaped by a [focus on competition and commercialisation](#).

Prior to the 1970s, most western countries had a [‘social contract’ between government and the research community](#) (p. 79). This was based on governments deciding the amount of funding provided but not limiting the autonomy of researchers to set the research agenda. Funding was largely provided directly to research institutions (through block grants) with minimal conditions on how it was spent (p. 79).

From the 1970s, neoliberal approaches to governance emerged in public research funding (PRF) systems. Funding was increasingly provided through [competitive project grants that were limited in time and scope](#) (pp. 3–4). Additionally, research organisations were expected to exhibit greater market orientation by focusing R&D on technology and innovation and increasing collaboration with industry (p. 4).

In recent years, some governments have taken a greater role in directing the focus of research and ensuring that research is aligned with government priorities – as reflected in the growth of ‘mission-oriented’ programs that focus on specific societal challenges.

Different types of research are also [suited to different funding approaches](#). As basic research explores the unknown, it is often suited to bottom-up approaches that provide researchers investigative freedom. In contrast, applied research aims to deliver specific outcomes and can be suited to targeted top-down programs (p. 33).

Funding instruments

A variety of common PRF instruments are used worldwide. While their key characteristics are broadly similar, the implementation of each type of support [tends to be complex and varies between countries](#) (p. 6).

Block grants

Most governments support research through the provision of 'block grants' directly to universities. In Australia there are [2 types of block grant](#); the Researcher Training Program, which supports postgraduate research students; and the Researcher Support Program, which funds a range of support services such as libraries, laboratories and technical staff. Internationally, block grants are [the largest source of government funding for universities](#) (p. 174).

Sizable block grants provide [funding stability](#) that enable universities to make large, long-term research investments (p. 26). Many countries [now link performance evaluation metrics to block grant allocations](#), although in many cases these evaluations have only a minor impact on funding (p. 80).

Competitive grants

Competitive grant programs require researchers to submit applications for funding, which are assessed by a panel of experts. The use of peer review panels for funding decisions is seen as a [marker of academic freedom](#) from political interference.

In Australia, large competitive grant programs are administered by the [Australian Research Council](#) (ARC), the [National Health and Medical Research Council](#) (NHMRC) and the [Medical Research Future Fund](#) (MRFF). Grant programs can focus on basic research (such as the ARC [Discovery Program](#)) or be focused on applied research and industry collaboration (such as the ARC [Linkage Program](#)). Competitive grants schemes can also operate across borders, such as the European Union's (EU) \$170 billion [Horizon Europe](#) program that Australia is [considering joining](#).

In the [United Kingdom](#) (UK) and [Australia](#), competitive grants do not cover the full cost of research. This leads universities to [cross-subsidise research costs](#) using income generated through other avenues, such as international students' fees.

Collaborative research infrastructure

The development of advanced research infrastructure (RI) often needs significant public funding. To maximise the benefits of RI, governments may require RI operators to [make it accessible to researchers](#) across the public and private sectors. This open-access model is used in the [EU](#) and in Australia, where access is coordinated through the [National Collaborative Research Infrastructure Strategy](#) (NCRIS). The Australian Government investment in RI is planned through the development of 5-yearly National Research Infrastructure Roadmaps (a new [roadmap is due in 2026](#)).

The [largest RI can be international in scope](#) and funded through international partnerships (p. 16). Prominent examples include the [Large Hadron Collider](#) particle accelerator and the [Square Kilometre Array](#) (a radio astronomy partnership involving 16 countries) which is building telescope arrays in Western Australia and South Africa.

Tax incentives

In 2024, tax relief for businesses investing in R&D was used in [34 of 38 OECD countries](#), accounting for [approximately 55% of government support](#) for business R&D. In Australia, the R&D Tax Incentive (RDTI) is [the largest component of government funding for R&D](#).

The [OECD found that every 1 unit of support through R&D tax credits generates 1.4 units in additional R&D investment](#) (pp. 6–7). Tax incentives were more effective in generating spending for experimental development (as opposed to basic and applied research) and when used by small and medium businesses rather than large businesses.

Mission-oriented innovation policies

Mission-oriented innovation policies (MOIPs) are a top-down approach that use a [co-ordinated package of research and innovation policies](#) targeted at addressing complex societal challenges in a defined timeframe (p. 11).

MOIPs require government to [set a direction for research but not to ‘pick winners’](#) by identifying individual firms or sectors (pp. 805–806). Some evidence suggests MOIPs can be more effective in generating [productivity and economic growth](#) than market-based approaches (p. iv). In Australia, the [MRFF uses a mission approach to funding](#), while the CSIRO is [reportedly ending](#) its [missions program](#) after 6 years of operation.

Public research organisations

Public research organisations (PRO) are non-university public agencies that carry out R&D (such as the CSIRO). Across the OECD, PRO funding [has reduced by almost 50% since the 1980s](#) (p. 223). Increasingly, including in Australia, PRF is being directed at universities at the expense of PROs (pp. 223–224). However, not all OECD countries have followed this path. It is notable that several countries with the largest research budgets, such as the United States (US), China, Germany and Korea have a PRO funding share that is above the OECD average and relatively stable (pp. 224–225).

Considerations in funding R&D

The role of competition in research funding

Competition to make discoveries and gain peer recognition has long been a part of the scientific community. The emergence of competition as a core principle in the allocation of research funding has, however, arguably shifted the focus of researchers from [a competition for results to a competition for resources](#) (pp. 378–79).

This role of competition is most obvious in relation to competitive grant programs (such as ARC and NHMRC grants) but university block funding allocations may also include competitive criteria. In Australia, this includes [staff attainment of competitive grant funding](#) being used in the calculation of block grant funding. Additionally, MOIPs and other top-down funding mechanisms can also use competitive mechanisms to allocate funding.

Competition for research funding is intended to drive research excellence and is considered to [increase the quality of grant proposals and provide confidence in the fairness and transparency](#) of the allocation process (p. 23). However, competitive processes can be resource-intensive. Research has investigated the effect of abolishing competitive grants and instead, equally distributing government funding among university researchers. In the US and the Netherlands, [this would provide each researcher an annual research budget of over US\\$100,000](#). The primacy of competitive allocation processes, however, is such that there is relatively little questioning of whether the gains in research quality are justified by the costs of these programs.

The greatest drawback of competitive processes is the considerable time spent by researchers on applications. A study of the applications for NHMRC grants in 2012 estimated that the time spent preparing applications for that year alone cost \$66 million and was [equivalent to 550 working years of research](#). The funding efficiency of programs is particularly questionable when application success rates are low. Once the time spent preparing applications is considered, [some grant programs draw more money from the research system than they provide](#), arguably impeding rather than supporting research.

A related issue is the potential for competitive processes to generate a ‘[Matthew effect](#)’ where those with resources accumulate more over time at the expense of others. Success in gaining funding early in a career both [increases the chances of gaining future funding and is linked to career progression and the transition from contract to permanent employment](#) (pp. 130, 314). There is also evidence suggesting that [women and under-represented minorities receive less research funding](#) and, in many grant programs, have lower application success rates (p. 280). Due to the Matthew effect, inequality in the distribution of funds to early career researchers may entrench inequality throughout later career stages.

Prioritising purpose or curiosity

Governments in many countries have prioritised a top-down approach using targeted R&D funding to support their national objectives. This approach is seen in South Korea, Singapore, Taiwan, and China, [which have used R&D to develop domestic technological capabilities](#) (p. 381).

The top-down orientation is also seen in Germany and in a large portion of R&D funding programs in the US. Both of these countries, like the Asian nations above, [feature an academic culture that is more oriented towards the practical application of research](#) (p. 1). A common feature in many of the [top-down oriented countries is a National Research Foundation](#), which centralises PRF planning and strategy (p. 63).

By contrast, in Australia, Canada, and the UK, the curiosity motivation has been relatively strong, with [academic cultures steeped in the pursuit of knowledge](#) for its own sake (p. 1). These countries exhibit a liberal policy orientation with ‘bottom-up’ policies structured around competitive allocation mechanisms and business tax credits. Despite the use of

competitive, market-based instruments, industry funded R&D in these countries is relatively low, with universities funding a comparatively large proportion of R&D (p. v).

In some top-down countries, such as [South Korea](#) (p. 30), close links between the research and industry sectors have resulted in a focus on applied research and commercialisation. As a result of the success of these countries, the policy debate in many bottom-up oriented countries, [including Australia](#), has concentrated on increasing industry focused research and [removing barriers to commercialisation](#).

Over the long term, however, public funding of basic research remains a critical foundation of the R&D sector, as highlighted in a study that found that [all new drugs approved in the US between 2010 and 2016 relied on knowledge generated through publicly funded basic research](#). Yet other research suggests that governments [invest many times less in basic research](#) than is required to achieve the maximum economic benefits (p. 1085).

The current policy focus in countries such as Australia on commercialisation, as well as the [move in Korea to increase funding for basic research](#) (p. 30), highlights that no funding approach is perfect. Although stakeholders often focus on the quantity of funding spent on R&D, how these funds are spent will also significantly affect a nation's science and innovation outcomes. Governments face an ongoing challenge to strike the right balance between funding applied and basic research and supporting academic curiosity and purpose-driven research.

Further reading

- Benedetto Lepori, Ben Jongbloed, and Diana Hicks (eds), [Handbook of Public Funding of Research](#), (Cheltenham: Edward Elgar Publishing, 2023).
- Dr Hazel Ferguson, [University Research Funding: a Quick Guide](#), Research paper series, 2021–22, (Canberra: Parliamentary Library, 2022).
- Dr Robyn Prior and Tim Brennan, [R&D and Innovation in Australia: 2024 Update](#), Research paper series, 2024–25, (Canberra: Parliamentary Library, 2025).
- Dr Robyn Prior and Tim Brennan, [Australia's R&D and Innovation Metrics: an Explainer](#), Research paper series, 2024–25, (Canberra: Parliamentary Library, 2025).

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