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HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON EMPLOYMENT, EDUCATION AND TRAINING

Funding Australia's research

(Public)

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HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON EMPLOYMENT, EDUCATION AND TRAINING

Monday, 20 August 2018

Members in attendance: Ms Butler, Mr Evans, Mr Giles, Mr Laming, Ms Sharkie, Mrs Sudmalis.

Terms of Reference for the Inquiry:

To inquire into and report on:

The efficiency, effectiveness and coherency of Australian Government funding for research, in the following terms:

- The diversity, fragmentation and efficiency of research investment across the Australian Government, including the range of programs, guidelines and methods of assessment of grants;
- The process and administrative role undertaken by research institutions, in particular universities, in developing and managing applications for research funding;
- The effectiveness and efficiency of operating a dual funding system for university research, namely competitive grants and performance-based block grants to cover systemic costs of research; and
- Opportunities to maximise the impact of funding by ensuring optimal simplicity and efficiency for researchers and research institutions while prioritising delivery of national priorities and public benefit.

This inquiry will be focused on federally funded research agencies, their funding mechanisms and university collaborative research. The inquiry will not consider the National Health and Medical Research Council, nor non-federal research funding.

WITNESSES

CHAPMAN, Professor Bruce, Academy of the Social Sciences in Australia 5

CHO, Professor George, AM, Acting Deputy Vice-Chancellor Research and Innovation, University of Canberra 1

CLEMENTS, Mr Dylan, Programs Manager, Academy of the Social Sciences in Australia 5

DAY, Dr Charles, Chief Executive Officer, Office of Innovation and Science Australia 5

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KELLY, Professor Mary, Deputy Vice-Chancellor Research, Development and Industry, Charles Sturt University 1

McMAHON, Dr Roisin, Deputy Chair, Australian Early and Mid-Career Researcher Forum Executive Committee 5

NANCARROW, Professor Susan, Deputy Vice-Chancellor Research, Southern Cross University 1

ROBERTSON, Dr Douglas, Director Research Services Division, Australian National University 1

STRELEIN, Dr Lisa, Executive Director of Research and Education, Australian Institute of Aboriginal and Torres Strait Islander Studies 5

THOMSON, Ms Vicki, Chief Executive Officer, Group of Eight 1

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THOMSON, Ms Vicki, Chief Executive Officer, Group of Eight

Committee met at 10:43

CHAIR (Mr Laming): Welcome. This hearing is being recorded and broadcast. It's a legal proceeding of the parliament and warrants the same respect as proceedings of the House. False or misleading evidence is a serious matter and can be regarded as a contempt of parliament. The evidence given today, while we remain with a quorum, attracts parliamentary privilege until we tell you otherwise.

We've had a great summary, and we're speaking to four of the universities we haven't had a chance to meet with so far. We welcome Group of Eight and the ATN as well. Maybe we could throw to you, because you've heard what's been said previously by a lot of your member universities. Are there any elements you want to pick up on and emphasise? There have been a lot of submissions to us suggesting different approaches—yes to the two-tiered approach to applications and no to that idea. So you might want to go to the areas where there's been a little bit of disagreement between some of your member universities.

Ms Thomson: I will speak in the broad, and I will pick up on many of the comments that colleagues have made. These guys are at the coal face actually doing the job day to day. I work, and we work, at the strategic level. I have to say that this inquiry is not before time. So it's very welcomed. I realise that you're at the end of the process. We know that research funding delivers bang for its buck, and we know that from the economic impact analysis that the Go8 released last week, but it's true for the whole sector; we just took a cut from us, of course. We know that for every $1 of taxpayers' money that's invested there's nearly a $10 return. So it's not wasted, and it's a very important investment.

In that vein, I guess the key points for us—and I'm hearing it across the submissions I've looked at—are the funding of indirect research costs, which I think you've heard before, and a principle that research is funded on peer reviewed research excellence. We get that through the ARC and the NHMRC, but it's a little more opaque in some areas, where significant sums of funding are allocated for research projects where we're not quite sure what the process might be. We've had that quite recently, as you would be aware, with funding for the Great Barrier Reef research. So we would certainly push very strongly that we maintain that peer reviewed research excellence funding high bar.

I won't go into the indirect costs, because others will, but I'm happy to talk more to that. I did want to give a shout out to the MRFF as a positive. It's a very good fund used, potentially, as an example of what else we could do with funding, which is not just about funding research but is also about capacity building. The MRFF does that, and it does that very well. Certainly the Group of Eight, through our chair, Professor Ian Jacobs, has put the point very strongly that what is missing in the system is a translational research fund. We looked at the MRFF as a model, and—notwithstanding some of the teething issues that it's had in terms of distribution and governance—we think there's a very good model there that government has introduced in terms of funding translational research. You have to fund discovery research, obviously, to have something to translate.

I think we're all on the same page about ERA; I'm not sure. It shouldn't be a set and forget, and we feel that's where ERA—ERA was really important when it started six years ago, we've had two rounds. I think it was very important institutionally—for institutions to actually look at their own cupboards and get things in order. As colleagues at the table have said, actually administering that is quite expensive. We estimate it's around $8 million for our eight universities. So if you extrapolate that, that's a lot of money that 40-odd universities around the country are spending on a very regular basis. That's money that could be spent in better ways. So, at the broadest level, it's probably time to revisit and look at that. I don't know whether you throw the baby out with the bath water, but you certainly need to look at the time frames—Douglas has mentioned five years. We know that what they do in the UK is quite successful. Frankly, ERA is a very good marketing tool for universities, but I'm not sure it's very good for much else. It's good for me—and I'm sure for others—to be able to say that 99 per cent of our research which is assessed by the Australian government is world class and above, although as Douglas points

out that's an average. So, as a marketing tool, it's very good, I think it has led to greater transparency, but it may have had its day in its current model. I think it's time for us now to look at something a little different.

Ms Hindmarsh: We would agree that simplifying administrative processes is important, and we would be supportive of a two-stage process. We've seen it work in the European Commission and in the CRCs. So the ATN is supportive of that. I think there's also opportunity, as others have said, around integrating application and management systems, like prepopulating with ORCID database and things like that. They're all fairly straightforward things that could potentially make a difference.

One thing that I'm not sure has been covered but that we wanted to put on the record is the remit of the research councils. The ARC and the NHMRC both do a great job, but as we're seeing a rise in cross-disciplinary research, there is sometimes a tendency for projects to fall between the cracks between the two funders and uncertainty about whether it should be ARC or NHMRC. So we think that there should be clearer guidelines and, potentially, mutually exclusive guidelines, so it's very clear for the researchers to know where to go and to make sure that it's being assessed by the right people.

I think it would be remiss of me to not talk about the quantum of funding as well—not just from government, but also growing the pie from end users as well. We have advocated for a long time for the R&D tax incentive collaboration premium to grow that pie significantly and meaningfully, as others have said today.

CHAIR: If the MRFF were to be slightly broadened in scope—which there is no intention to do—is there a way of doing that that would increase the pie on the ARC side of things? If so, how might one open up medical research more broadly?

Mr Robertson: If one had an MRFF equivalent, one would then attract private sector leverage to invest. I think you talked previously in one of your sessions about proof of concept funding. I was involved in a scheme called University Challenge in the UK. It was a relatively small amount of money—I think the level of the scheme was 70 million pounds, but I would have to check that. I did some work 10 years after that scheme and there was 10 times leverage from the private sector. When you're talking about a research investment and trying to get innovation into industry, you need to take an appropriately long timeline to check where the leverage is coming from. It can take 10 years to get a product from a research bench to a full product in the market place. It's only at that point that you get leverage.

CHAIR: I welcome my colleagues Ms Butler and Mr Giles. We've had great chat so far with four of the universities that we haven't heard from before, welcoming the Group of Eight and the Australian Technology Network as well. Do you have any recommendation on how you grow the pie, whether you could see that an easy way of doing it might be through broadening the Medical Research Future Fund objectives?

Ms Hindmarsh: I think the points that's been made by others to have one that's not directed solely at medical research would be beneficial to the entire sector, not just because of the leverage but also because it's a signalling mechanism that this is an important priority for us nationally and that we are encouraging people to engage. We know that Australia is second last in the OECD when it comes to collaboration with industry. It's sometimes not through lack of trying from the universities' perspective. We certainly value it. I know the ATN universities definitely value collaboration with industry, but that's replicated across the sector. So having an opportunity to make it clear and accessible would be great.

Prof. Kelly: I think one of the other opportunities that we need to look at as a sector and innovation system more broadly is that certainly we have the MRFF have and the focus on medical, and if we had an innovation equivalent. I think it's really, really critical that we don't forget that the arts, education and humanities bring us our social licence to conduct research and bring us social acceptance of the changes and innovations that we seek to introduce. So when you look at the funding to the ARC versus NHMRC and MRFF, ARC is trying to fund all of those societal impact disciplines—the arts, humanities and education—and science and medicine. Public understanding and public adoption of the innovation and the changes that research can bring needs to be much more part of the funding picture, so that we can look at water quality or medical changes and understand what that means to society, and our individual families can understand what that means. In broadening the scope, I think we have to ensure that social sciences are part of that, so that we understand what the Australian public wants and where the boundaries of adoption and acceptance are.

Prof. Nancarrow: I want to touch on research infrastructure. We haven't talked about that. One of the issues from a regional perspective is that a lot of the large research infrastructure is localised in large centres. That is appropriate, but it also presents a huge opportunity for capacity building in regional areas. I'll give you an example of the University of Southern Queensland. They have access to radio telescopes. It's brought huge international collaborations for them. But in a small regional area it also means that they have access to really

high-quality science professors, STEM disciplines, which means that the people who graduate from their universities tend to go out with high-quality physics and maths. That's a problem in our area. The kids in the regional areas have opportunities to learn about physics that they may not have in other areas. We have the National Marine Science Centre. There are opportunities around aquaculture. There have been a number of national- and state-level programs to try to identify and coordinate infrastructure, but we haven't got there yet. I think it's a real opportunity to be strategic about the way that we spend money to support regional specialisations not just for the regional universities but to grow capacity nationally without duplicating infrastructure.

CHAIR: We also have an interest—and I think you might have touched on this issue—in supporting the newbies without losing focus on the great outcomes from people with track records. Are there any ways of nudging that one way or the other? Do you have any recommendations to make sure that we're looking after the whole spectrum of researcher life cycle?

Prof. Kelly: The CRN was an incredible opportunity in early childhood education. CSU was the lead on one of the CRNs. That allowed a broader approach to risk taking. It was a considered risk. It was in a framework where you had a mix of experts and emerging researchers and expert and emerging ideas.

We've also got to be really careful in our sector that we don't become victims of our own success. The Future Fellowships program was an incredible period of growth. It attracted talent back home and it attracted international talent, but it also made people more attractive to the international sector. We have to make sure we do that follow-up. We had a massive boost into the system. We've got to make sure that we have the follow-up to keep that talent and continue to grow it.

Coming back to all of the comments that we've made about what our researchers spend their time doing, it's not all research, unfortunately. But one thing that I think we do need to create space for them to do is to mentor. I think that, as institutions and as a sector, we really have to bring forward the mentoring of our emerging and early-career researchers, allow them to shine and take some measured risks with them, because they are our future. The UK has seen it. Chemistry in the UK had a massive growth period, but they all retired within a five-year window, and the whole discipline suffered across the UK. We can't risk that happening here. We really can't.

Mr Robertson: I would echo the call to make sure that we sustain early- and mid-career fellowship programs. We have to make sure that we plan that. We're looking at the future, so we have to take a long-term view, and we need to make sure we have investments in the talent at different points in the age cycle—both those who are the real achievers and those who are tomorrow's achievers.

CHAIR: Great. We're at the point now where, if there are one or two other points not adequately emphasised, we're happy to take them on record.

Mr Robertson: You've touched previously on international issues. High-quality research is a global business, and I think we are not investing sufficiently in international collaborations, particularly collaborations with Horizon 2020, where many European countries would be keen to have Australian partners. They obviously can't fund us. The NHMRC has a very small scheme that allows engagement with Horizon 2020, but we really need to deliver—

CHAIR: Is that only medical research?

Mr Robertson: That's in medical research only.

CHAIR: There's no equivalent for non-medical?

Mr Robertson: There's no equivalent for the European collaborations, no. There are a couple of schemes for China and India, but again they are very small schemes with single-project funding, and it doesn't allow the level of engagement in collaborative research internationally. We still engage internationally, but that's through the conference process rather than through the joint activities being planned internationally and collectively.

Prof. Cho: Could I just add that the word is collaboration both domestically and internationally. Domestic collaboration broadens the base of the researchers and also, within institutions, increases the depth of researchers. It's a fantastic training ground for ECRs and for HDR students.

Ms Thomson: Can I just pick up on the Horizon 2020 and collaboration. There is an opportunity for Australia in the new iteration of Horizon 2020, which will be Horizon Europe, and the European Parliament are discussing that in September-October this year. There is an opportunity for Australia, depending on what happens with Brexit and everything else, to be listed as an associated country. I think that is the definition of Australia in doing that.

CHAIR: The same as Eurovision?

Ms Thomson: Yes, exactly! I certainly was in Europe recently and met with members of the European Parliament, and I spoke to our government officials there to impress upon our Australian government and the department of education and industry that the fund is a really important one for Australia to be at the table to access. It opens up a whole lot of funding for researchers across all domains—not just in medical research; this is in all domains. If there were a message that I could leave on that score—and it may not be quite within your terms of reference—it would be that the Group of Eight would be very strongly supportive of any support we can get through this committee in urging the government to look at what it would take to be at the table. I can't speak for others, but certainly we would be.

CHAIR: All right. Thanks everyone. That's a pretty great point to finish on in introducing Mrs Sudmalis. It's great to have you with us. Ann's doing the next roundtable. If you've been asked to provide more information, particularly the international comparisons that you referred to, examples of doing things in a more streamlined manner, we wouldn't mind even more detail being sent through to us in the next week if that's not too much of an administrative burden. You'll have a transcript of this process—the first half of it obviously was just an informal meeting—that you'll be able to check and suggest changes. We thank you very much for your time and for contributing today.

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STRELEIN, Dr Lisa, Executive Director of Research and Education, Australian Institute of Aboriginal and Torres Strait Islander Studies

[11:03]

CHAIR: Welcome to each of you for being basically the icing on the cake in our roundtable. We're now broadcasting. As you may have heard earlier on, we don't require you to give evidence under oath but we remind witnesses that these hearings are legal proceedings of parliament and warrant the same respect as proceedings of the House. False or misleading evidence is a serious matter and can be regarded as a contempt of parliament. The evidence given today will be recorded by Hansard and attracts parliamentary privilege. You'll have a transcript to look at after this meeting to make sure that it's all word perfect. We have someone appearing via teleconference, and that is Emeritus Professor Keith Houghton from Research Coaching Australia. Thanks for making the time to be here on this busy day. Do any of you have additional comments about the capacity in which you appear?

Dr McMahon: I am an Australian public servant employed by the Department of Health, but I don't speak in that capacity today.

Prof. Chapman: Glenn Withers, who is the president of the Academy of the Social Sciences in Australia, couldn't make it today and invited to me to step in. I'm not as informed as I might be—that's generally true!—and so I've invited Dylan Clements to come with me.

Dr Strelein: I apologies on behalf of the CEO of the Australian Institute of Aboriginal and Torres Strait Islander Studies, Craig Ritchie, who is unable to be here.

Prof. Houghton: The CEO of Research Coaching Australia, Mark Clisby, is unable to be here.

CHAIR: Welcome. Many of you have already read the transcripts from our previous round tables. Thank you for being here, which is our final opportunity to gather some evidence for our inquiry. Typically people will read statements, but I think it's more important that today we go right to the elements you want to see emphasised, with a real focus on what kinds of recommendations you'd like to see from this inquiry, given you've now had a chance to read the other submissions and the transcripts of our hearings. Did anyone want to kick off with a real solutions based approach to what you'd like to see us focus on in our report?

Dr Higgins: Thank you for the chance to join you here today. It goes without saying, I think, that the Australian Academy of Science supports a strong and robust research sector. The ability to conduct high-quality research is of critical importance to the national economy and for social, medical, industrial and educational development. That ability is enabled by the research funding system. The Academy of Science supports a research funding environment that is fair and equitable, rigorous and transparent, strongly based on scientific merit and geared towards scientific excellence, accessible to researchers without undue administrative burden, stable enough to develop long-term research strengths, flexible enough to support innovative research pathways and sufficient to allow a research career to develop from PhD and early-career research through to research leaders. Continuity and a career for researchers are really important.

You've heard a lot about blue sky research too, I'm sure. We reinforce that message very much. Curiosity-driven research is absolutely foundational. It develops skills and capacity and provides a knowledge base to build research sector organisations. We would like to see blue sky research preserved and expanded. We are keen to reduce the administrative burden on grant applicants and research bodies. We think scientists are best left to doing their science. But we do know that the ARC and the NHMRC are highly professional organisations that are sensitive to the needs of their stakeholders. We know they consult widely and are very transparent in their reform processes. The NHMRC is already currently undertaking major reforms of their grant processes.

We think there are routes available to improve the efficiency of research funding systems, and this inquiry will put signposts on those routes. The academy wants to see what's best for Australian science and research. We made key points in our submission. Can I just briefly mention those? Long-term funding growth and program stability

are absolutely vital for the research funding environment. Scientific merit should always be the driver, supported by rigorous and transparent review. We, of course, support streamlined and efficient funding processes. For us, 'streamlined and efficient' also means free from bias. We want to reduce barriers to gender equity and diversity. These should be priorities.

CHAIR: How do we do that?

Dr Higgins: By making sure that there is recognition that people with diverse backgrounds may have periods of interruption during their careers. That should be recognised. For instance, they may be out of the workforce for five to 10 years, and it is very important to recognise that and give credit for some of that time, where possible.

There should be provisions for blue sky research. Of course, we also see that it's important that there is a good association between academia and industry. That's a difficult thing to manage, but we also support that, with different funding mechanisms. We recommend a national research Future Fund based on the Medical Research Future Fund to support and supplement high-value basic research that cannot be adequately supported through other mechanisms and to support large-scale priority-driven research, such as future national missions.

CHAIR: Is there any difference between simply increasing the quantum of funding or setting it up in a national research Future Fund type vehicle? Is there any difference between having the vehicle and simply having an increase in funding base for the ARC?

Dr Higgins: Having the vehicle, I think, does give you the flexibility to fund big new initiatives that you can't often fund through the existing granting scheme.

CHAIR: I might just dive along.

Dr Higgins: I'll stop there.

CHAIR: We'll come back again. Do you want to pick up on some of those particular issues around the funding base?

Dr Day: Certainly, I can pick up on a number and on some of the highlights from our report. We would certainly agree that we need diverse innovation system support for basic and applied research—that is very important. One of the things that we observed when we did our 2030 review of the national innovation system was just the number of times that the systems had been inquired into and changes made. Stability is really important in driving long-term research horizons. We encourage stability in the policy frameworks that are in place over research. Having said that, I don't think we would argue that stability implies stasis. Constant evolution is a good thing. I know the NHMRC is outside of the parameters for this review, but I think the process that they have recently been through in reviewing their grant giving processes was a productive, successful process and a good example of how an existing organisation can refresh its approach to delivering grants. Others could learn from that.

In terms of the structure and the arrangements around research funding, we note that the Watt review was delivered to government a few years ago. The changes that resulted from the Watt review are still washing through the system. We think that it would be appropriate to give some of those changes more time to work their way through the system before trying to make additional changes on top of that.

The last thing I would say is that we think it's important that we gather as much longitudinal evidence, over time, of the impact and effectiveness of research funding. Again, this is a plea for stability in the system, because, without that stability, you can't generate a viable long-term evidence base that can support and improve policy design.

Prof. Chapman: The Academy of the Social Sciences would endorse all of those statements about the value of research, particularly about blue sky research and leading academics to pursue their own creative ends. We never know where it ends. Often it doesn't end, in my experience, where you would expect, so it's very hard to pick winners.

All of the issues that are in our submission are related in one way or another to funding, partly because the people involved in this are interested in the economics and the public policy issues. I think researchers have been saying, probably forever: 'We're wonderful. We do wonderful things. Please help us and finance us more and more.' I would note that as far as I can tell the research funding that comes from government in Australia is international—in parity of contexts, relatively low. But I don't think it's a useful thing for us as researchers to say, 'Come on, we give you fantastic returns. How about treating us generously?' We wouldn't be in these careers if we didn't care about research and feel that it was extremely important.

So there were three specific suggestions made in the academy submission. I'll talk briefly about two of them and Dylan will talk about the third one which is about the measurement of research metrics.

Maybe two or three years ago, Glenn Withers and I wrote a paper which tried to recognise the budget constraints of research funding in the context of a perceived need at that time—the end of 2015, beginning of 2016—relating to the lack of coordination between business, commerce in general and academic research. While the ARC linkage grants do address that, they are grants, and, if we said, 'Just double the linkage grants and that will help us in our relationships in business and for patents and for commercial engagement with the university sector,' I don't think that would be particularly compelling. Even if you can make the case, budget constraints are very powerful things.

So the idea that we had comes down to a concept called a contingent debt. The first contingent loan or debt was the HECS system. I've been involved in the HECS system for 30 years now—which is quite amazing really—and not just in the student loan space but taking the whole template of government as risk manager. There are striking examples at the moment whereby you could use contingent debt to take pressure off budgets. I'll give you one example. You only have to have drawn breath once in the last few weeks to feel sympathy and potency of the drought. What governments typically do in droughts is put a lot of money into it very publicly; that happened yesterday. It happened before then. Even before this drought became obviously very severe for most of New South Wales, there was a drought fund that had been administered or led by Barnaby Joyce.

I have major issues with drought funding. I'll get onto the research side in a minute—but one of the problems is that the scariest thing for a farmer is not drought. The scariest thing for a farmer is foreclosure on the property—default. So reluctance of farmer businesses to borrow from commercial banks is completely easy to understand. One of the problems with the current drought policy is not the grants—they've got a problem with regressivity, in my mind—but it is that the current arrangements are that there will be interest subsidised loans given to farmers. But they have to be reworked at the end of the time period—10 years; I think the one announced yesterday was five years—and turned into commercial loans, that is, with a bank. What does that mean? It means foreclosure risk. And agriculture is not like most other businesses, because the farm business is the farm home; it's a family home. It could have been in the family for generations. So you've really ruined your life if you're the farmer who is in charge of a situation where you lose the property and it's gone through foreclosure.

Here is a different way of thinking about debt; let me just describe it very simply. With profit or revenue contingent debt, you can satisfy the political need to help people who are in a terrible situation in the short term, but put the funding in a system which gets repaid—not all of it; it's a government decision about how much; it could be half; it could be three-quarters; that's policy—but only depending on future profits. We've modelled this for 15 years, basically. So we're fairly sure that it would work, and administratively it is extremely straightforward.

Take that basic concept and let's put it into research funding. Imagine your business. You might be the Business Council of Australia. You might be Telstra. You might be BHP. You've got a project that you really would like some academics to look at—completely curiosity driven, not politically motivated. You just don't know about stuff. You can't get the resources from government, because governments, in a budgetary sense, are always parsimonious, and it looks risky. All research can look risky, because it's research—we don't know what we're doing at the beginning except defining a question, basically.

So the idea would be that academics, by themselves but with partnership from business—either private companies or collections of businesses such as the Business Council—could come up with projects. I'll just invent one. Let's imagine that you want to have a debate about what are the true implications for equity, wealth creation, profitability and taxation of cutting company taxes, just to take something random. How do you try and work that out? You can go to the literature yourself or you can go to some tax economists and say, 'What do you think?' But there will be so many unanswered questions, particularly in a contemporaneous context. The world changes all the time. You might want to institute a three- or four-year partnership where you've got the best tax economists talking about getting the best people in from overseas, saying: 'What is the most recent research? What do the data tell us about this? What are the alternative uses of the outlays? What does it mean for budget deficits? How would you finance it?' These are really complicated things. You need conferences. You need workshops. You need peer-reviewed analysis. You need overseas visitors and overseas liaison to see what the best practices are, mainly because they do change a lot.

A business financing that by themselves is very likely to be problematic. They've got to find the money. So the plan would be that some part of the university costs, maybe a lot of them—when I apply for ARC funding, my salary doesn't get covered, but I can appoint people and we can have conferences. So you take a bunch of financial resources for a defined project, vetted and appraised by groups like the ARC, with business. Business is prepared to put in a certain amount of money. How is it financed in the short run? Through government. But it's not as a grant. It's as a contingent debt. It's designed very simply to make sure that some part of the outlays are

returned to the public sector. You don't want to make it too specific, because the idea of saying, 'We're doing this research project and we can then look at the value added for our company'—you won't know what the value added is. Sometimes it won't be for a very long time. The time lags are very complicated. To part-finance it, the government says: 'We're going to collect a bit of it back. We'll do it in the most simple possible way—one or two percentage points on profits.' What that means is that there are no default issues and there are no risk issues, because these are consumption-smoothing or, in business terms, revenue-smoothing devices. I've brought along copies of the paper that Professor Withers and I wrote, because I didn't think there was enough detail about how it might work.

CHAIR: We'll grab that. That would be good. Just so that we complete the loop and then come back again, can we cover the third issue, Mr Clements, if that's possible? But, Professor Chapman, was there a second point that you were coming to?

Prof. Chapman: There is.

CHAIR: Just touch on that one, and then will come back.

Prof. Chapman: It's really about the employment of the endowment funds. The endowment funds have been frozen. I understand—but I'm not sure about this—that the idea is that the endowment funds might be used to help part-finance NDIS. One thing that the social sciences can do and research would be to use some part of that funding on deployment of NDIS resources. This is basically public policy. That's what social sciences do, in part. So the idea coming from the academy was that maybe some thought should be given to some part of that fund being used in a research capacity to help with the implementation and the evaluation of the NDIS. Dylan?

Mr Clements: The final point we made in the submission was just about research metrics. That's relevant because competitive grant funding is decided on the basis of perceived impact. We have long argued—and there is a vast literature about this as well—that these exhibit systematic biases against the humanities and social sciences. There are a few ways in which this happens. One of them is that indexing services—Web of Science and Scopus are the main ones which are used—don't very reliably pick up books and book chapters, while they're very reliable at picking up journal articles. And humanities and social sciences tend to produce more of their main works in books and book chapters.

CHAIR: Is that something that is a problem? Is a book chapter peer reviewed?

Mr Clements: A book chapter is generally peer reviewed. It will depend on the book.

CHAIR: By the author?

Mr Clements: It will be by an editor, oftentimes.

CHAIR: Do you think people would accept that that's peer review?

Mr Clements: Some people will not accept that it's peer reviewed. It will depend. There are some extremely credible books and some very low quality books, if I may say.

CHAIR: Why not just keep the bar that, ultimately, you want to have it peer reviewed—and then you know where to go to get it reviewed—and let people write books in their spare time?

Mr Clements: It would be possible to argue that. The cost, for the standard of scholarship in social sciences and humanities if you decided not to count books, would be extremely high, I would say. I wouldn't want to try and quantify this. I would say the cost would be, to some extent, qualitative. It would change the character of the kind of research that one can do, in the spirit of blue-sky research. If you lost blue-sky research, we tend to think, that would have some qualitative impact on the standard of scholarship, and so too with books. It's the kind of sustained engagement which is relatively native, so to speak, for social sciences and humanities.

The second point was about the orthodoxy in STEM disciplines for co-authorship, which does not obtain in house to anything like the same extent. We think there should be some kind of effort to weight recognition of authorship proportional to whether or not it was co-authored. Once again, there are numerous propositions as to how one would go about this.

Ms BUTLER: It sounds hard. Would you just assume it's fifty-fifty? Might co-authors actually only contribute, say, 10 per cent, even if there are only two authors?

Mr Clements: It is hard. It it's up for grabs how one would go about implementing this. I personally don't have a strong stance on how one would go about it. Nonetheless, if a paper in the sciences, say, has 15 authors, it stands to reason that these 15 authors should not all be recognised to the same extent as a sole author for a counterpart paper in economics.

CHAIR: Dr Higgins, do you have any comment on that point?

Dr Higgins: This is a difficult one because many of the projects these days are so big that you frequently have 50 authors. In the case of something like gravitational waves, there might be 1,000 authors, all of them deserving credit, maybe not exactly proportionally. Still, it's a very difficult one.

Mr GILES: Dr McMahon, could you share your views on this as something your submission touches upon?

Dr McMahon: What I wanted to talk about today is actually to touch on some of Dr Higgins's comments about securing the future of research. A really strong element of that is supporting today's early and mid-career researchers because they are quite literally the future generation of scientific leaders. The Early and Mid-Career Researcher Forum that I represent today represents scientists who are up to about 15 years post PhD, so they're really in those early and mid-career stages, and that's a particularly challenging career stage. It's the point at which you're trying to establish your independence, make a name for yourself and carve out your particular expertise. There are a number of specific challenges of relevance that come at that stage relating to short-term contracting and career instability; intense competition for grant funding, which is obviously very relevant today; and a lack, perhaps, of role models of senior women and other under-represented minorities. And these challenges, which are relevant in developing your career, are happening at a time when many people take on care and responsibilities as well.

So, when preparing our submission, we surveyed our membership. We have about 4,000 members across the university and private sector and government and publicly funded research agencies, like CSIRO. The themes that we received from them with regard to funding were some concerns about the administrative burden of applying for competitive grants that have relatively low rates of success. We got strong messages that sometimes there was a marginal benefit in applying, and that's a big challenge when you're trying to establish yourself as an independent researcher. There were concerns about the systemic bias in the systems, which Dr Higgins also touched on, with consequences for gender equity and the representation of minorities across the sector, and also a really strong desire to be better able to participate in cross-sector collaboration—for example, between universities. And industry found that early- to mid-career researchers are passionate, they're talented, they really want to carve out a career and contribute to new knowledge and innovation, and they would like to work more across sectors—for example, university and private sector collaboration. They feel ill-equipped to do so, and they're not necessarily sure how they should go about it and whether it would damage their career. That touches on the metrics we use to evaluate outputs and a bit of a mismatch that still exists between pure academia and being very industry focused. Those are really the concerns of our members in their early-career stage, and we see it as vital to supporting these future leaders in science.

Dr Higgins: If I could just add to that, I spend a fair bit of my time as a mentor. At my age, that's something I should be doing. That's one of the things that I feel most strongly about—the fact that I sometimes feel that I'm encouraging people to get into this area, but in the back of my mind I also see that there is not a good career path, really, for young people. There isn't the stability and the long-term security. This is true for everyone, of course, in the workforce everywhere. But people have spent 25 to 30 years being trained and suddenly they've got only a three-year project, and they mightn't have any other prospect in their research. So, there is a problem there about investment of that type, followed by the fact that they don't have any security or a career path. That is really a worry for me.

CHAIR: And I imagine that's particularly tough in your sector. Do you want to tell us a little bit about the research trajectory for those working in your field?

Ms Hindmarsh: Certainly for Indigenous researchers there is still a gap in terms of parity in participation. And also, interestingly, a lot of Indigenous researchers are still coming through from alternative pathways into research careers, which means that their research careers can be much shorter, if they're doing their PhDs later in life. That is changing, but it's still a significant factor in looking at the participation of Indigenous people in research careers, and also the administrative demands on successful Indigenous researchers. It's a great thing that there's an increase in Indigenous leadership across the university sector—development of pro-vice-chancellors and deputy vice-chancellors in Indigenous leadership or Indigenous across the sector. But those leadership roles are at a cost to their research careers. So, there's continued need to focus on programs that bridge the gap and are specifically directed to Indigenous people's career development. Those are available through the development of the Indigenous discovery programs of the Australian Research Council and various programs of NHMRC. We're not anywhere near the point where those programs are obviated.

I guess there's also, particularly from our perspective, a need for greater recognition of Indigenous participation in research from Indigenous communities themselves. Obviously research and research funding is a great opportunity for Indigenous communities to find solutions to some of the challenges or to build the resilience and resurgence of their culture and heritage. The cost of doing that research for the universities and communities that

are participating in research is actually quite high in terms of the kind of engagement that's required to get the answers that are needed. Often it's a sort of greyfields or brownfields—there's a problem, there's not a lot of comparative data to rely on, and there needs to be a sort of organic solution to those particular problems that are specific to those people and that place.

The costs of that kind of research are I think still not particularly well understand by funding bodies and by universities—for example, the discouragement for funding the participation of Indigenous peoples, who bring knowledge to a project as co-contributors to the research, being able to participate in the communication of research, participating in seminars, being recognised as authors and all of that, where we want to actually recognise Indigenous knowledge and Indigenous knowledge contribution to research. That has a cost associated with it.

It is difficult where there is a focus on partnering with industry—the social sector—and particularly Indigenous communities and peoples are not necessarily recognised as industry. Some groups are able to bring funding to those programs, but most will be unable to source funding to contribute to projects. How do we get that recognition for a lot of in-kind and volunteer participation? Boards of organisations are constantly being asked to provide voluntary support to projects, which may or may not be on their list of priorities—but they are generously contributing their time.

CHAIR: Are there any other avenues available that aren't through the ARC that are unique to your sector?

Dr Strelein: Yes, there are. With the Indigenous Advancement Strategy, for example, people can apply for project funding which may have a research component. At AIATSIS, for example, we do not have access to block grants. The competitive research grants that we get don't cover our administrative costs and that would be the same for other participating organisations. So there is an incentive for us to go other programs that will actually cover administrative costs. With our research budget, for example, we don't have a lot of appropriation to spend on research. All of ours is pretty much from grants, and most of those are non-competitive grant programs such as the IAS or others. So there is some funding available.

We have recently taken responsibility for the Indigenous research fund, which was the 2017 budget measure $10 million research fund, which we'll be implementing as an Indigenous research exchange, which will help—a very small amount of additional funding—but will be focused on translating research to assist Indigenous people to make decisions on the ground and for policymakers to be better informed. So that sort of practical funding is available. But accessing the competitive research funds is absolutely critical for that kind of research to continue and to have fewer constraints in terms of prescribed priorities that other programs might have.

CHAIR: Thank you. Professor Houghton, I know you've been listening intently. We're glad to connect with you today to talk about research efficiency in particular. We've all seen the graphs and understand them. Do you think there are some better ways of measuring? We are focused on research efficiency by giving some additional citation or impact weighting, rather than just listing publications per unit of investment.

Prof. Houghton: Can I start off by making a couple of comments about the submission from the Academy of the Social Sciences in Australia. A number of years ago—and I'm old enough to have been a professor for a few decades—I had a position at the University of Melbourne which included being chair of the university [inaudible] promotions committee, so I had the opportunity of comparing biologists with historians with musicologists with economists and whatever, and there is no doubt that what is an excellent researcher in one field looks very different to a researcher in another field. That doesn't mean that there's any difference in quality but what it takes to get from lecturer to senior lecturer in one field looks and is—certainly if you just count publications—very different to another. It even gets down to the fact that some researchers co-author with PhD students and some do not. David Pennington was the vice chancellor at the time and his riding instructions were, 'Keep the standard very high but be creative about how you demonstrate it.' That will illustrate just how different it is to measure quality research in different fields.

I'll give you one illustration of this. Research Coaching Australia has a very large database of research going back a number of years. For example, we have some data on co-authorship rates, and, for example, in 2014 the number of co-authors on, say, a paper in philosophy was 1.1. The number of co-authors on a physics paper was 129.3. So it's impossible to say that the amount of work done in one field exactly equals the amount in another.

That flows on to all sorts of things in universities, including workload models and the like. So I'd like to underscore that the notion of what a high-quality researcher looks like needs to be carefully considered in respect of the field, and what can be reasonably achieved in high-quality research does look and feel very different between the different fields of study.

Even when I was dean of economics and commerce at ANU, the level of productivity within that same college varied depending on which field-of-research code you were looking at. So a professor of actuarial science may not have looked as productive as, say, a professor of economics, but they all contributed greatly to the research reputation of the ANU.

With that aside, I might just make three points from the submission. Some of our work here at Research Coaching Australia is to try and understand the whole environment within which university researchers work, and the first point that we would make is: it needs to be in the context of the fact that there are essentially two outcomes that the vast majority of academic staff have. One is in research, and that is important, but there is also education. So the level of productivity or efficiency of one can't be examined outside the context of the other. As a consequence, we've used various techniques, including DEA, to try and map out the levels of efficiency, bearing in mind that one can be productive in education and less productive in research or the other way round.

I draw your attention first to graph No. 2, which is based on the Australian university sector, or, at least, 37 of the universities. We capture the universities other than Torrens, Notre Dame, Bond and the University of Divinity, so it is 37 universities that we would see as the public universities. What I have done is to map out the 2016 productivity frontier across the two dimensions of education efficiency, measured as students per million dollars spent, or research efficiency in publications. And that is unique-author publications, so if there are two authors it counts as 0.5. And you can see that the efficiency frontier is set out there in 2016. What I have done is to overlay 2011, and what we see is that there has been an enormous increase in the level of efficiency within universities, and, during that period from 2011 to 2016, it ran at around 3.25 per cent compound over the period, which is an extraordinarily good result.

CHAIR: Are you weighting by impact or just counting publications in a raw number?

Prof. Houghton: In this initial measure of efficiency, it's just counting publications. Hence, I commented to begin with that this is, at best, a crude indicator. But what we're trying to do here is to look at institutions, not within fields. So we're looking at the 37 institutions and the same institutions between the two years.

CHAIR: If you just had the line that was the line of best fit through the '11 and the '16 data, it appears to me that you've just got a frontier that maps the most efficient universities and you've drawn a line through them—

Prof. Houghton: Correct.

CHAIR: What are the rest of them doing?

Prof. Houghton: On average, they improved over the period by about 20 per cent, and the dollar value is deflated by the ABS index for education. So there has been a pretty substantial productivity improvement—

CHAIR: Have you broken it up between the regional universities, Group of Eight and the ATN?

Prof. Houghton: Yes. The green dots are the regional universities, the orange dots are the Group of Eight, the red ones are the ATN, the black ones are the innovative research group and the yellow ones are the non-grouped institutions, and what we find is: there are differences between them. The regional universities tend to cluster towards higher levels of an education focus, with one exception, and the Group of Eight tend to focus towards the research end of the frontier. But some really good universities are on or near the frontier in terms of being well respected in their research, and some are a little further away and vice versa. Some teaching-focused universities are on the frontier and some are some way back. So there is certainly diversity of outcomes in terms of efficiency and productivity. On average, the sector has gone up around 20 per cent over that period, with the most efficient being more than 40 per cent.

CHAIR: Thank you. Are there any questions?

Ms BUTLER: On this education efficiency question, presumably, when you worked out how many students were educated per million, you didn't distinguish between domestic and international students in assessing that; it was just a hard number based on effective full-time student numbers?

Prof. Houghton: In what I've reported here there are subanalyses, but the high-level analysis is total number of students, equivalent full-time load.

Ms BUTLER: It looks like it's costing the Group of Eight universities about $1 million to teach 25 students, and it's costing Regional Universities Network universities the same to teach almost twice as many students.

Prof. Houghton: Yes, if you look at graph 3 you'll see that, in a sense, there's an exchange rate between the cost of educating people and the cost of undertaking research, and it does vary quite widely within the sector. Some universities—you see I've drawn a line between the 'origin' and the 'frontier'. Seven of the eight Group of Eight universities form that focus group, and they are very efficient at producing research. Their relative cost is

less than eight EFTSL per publication, and at the more education-focused institutions it works out to be greater than 20.

Ms BUTLER: What you're saying to me is that, when it comes to teaching, Group of Eight universities are half as efficient as Regional Universities Network universities?

Prof. Houghton: What I am saying is that they have comparatively different skills, and yet we have a sort of fixed—

Ms BUTLER: I'm just asking about the X-axis at the moment, if we can just focus on the X. If I understand the graph, what I've described is 45 students per million if you're an RUN; 25 students per million if you're a Go8.

Prof. Houghton: Certainly the exchange rate is different, yes.

CHAIR: They're teaching different kinds of students.

Ms BUTLER: I've just accurately described what the X-axis means, haven't I?

Prof. Houghton: Yes, you have.

Ms BUTLER: So is there any connection, do you think, between the fact that Go8 universities receive much more revenue because of their higher intensity of international students that can pay much higher fees and the fact that they spend more per student on teaching?

Prof. Houghton: That's one of several factors; that's true. There are also differences in the subanalyses. It's also true that Go8 universities by and large have a higher proportion of PhD students, which are significantly more expensive to support than masters students, and there are a lot of them in the Go8 as opposed to undergraduates.

Ms BUTLER: We're talking about efficiency here. We're just talking about price per student. We're not in any way digging into questions of quality, the amount of revenue or the level of the student in terms of whether they're an undergraduate or a postgraduate, so it's a pretty blunt measure, isn't it?

Prof. Houghton: It is. At this high level, yes, it is a pretty blunt instrument. But it's a question of how much detail one can go into in a submission. So, yes, that's correct.

Ms BUTLER: For the ones with the dots that are higher on the Y-axis, that suggests that—if it is a trade-off, as you say; if it's an exchange rate—the higher they are on the Y-axis, the greater the opportunity cost of spending the money on teaching instead of research. Is that right—because the more publications they produce per million?

Prof. Houghton: Yes. There are a group of universities that will consume more resources to produce research than other universities.

Ms BUTLER: Another way of splitting up the graph would be to draw a horizontal line basically along the two publications per million, and say that universities that are in the sector above that line have a higher opportunity cost to produce research than universities below that line.

Prof. Houghton: Yes, and the extension of that is that, if there were a funding model that allowed universities to trade to their comparative advantage, the sector would have the opportunity of trading to their comparative advantage.

Ms BUTLER: Comparative advantage by definition takes into account opportunity cost, doesn't it—as I remember it?

Prof. Houghton: It does, yes. One thing that's interesting out of that is that, if you look at the extreme ends of the frontier, unlike the US, we don't have representation at the extreme ends of the frontier, towards either the horizontal axis or the vertical axis.

Ms BUTLER: Yes, okay. But, even if you look at that question of opportunity cost and efficiency in education, that doesn't tell us anything about the quality of the research that would be forgone by the universities that decide to lean more towards teaching than towards research.

Prof. Houghton: As I said, at this level of analysis, we don't capture research quality and we don't capture education quality. We do have three ways of measuring the subanalyses I've reported. We have three ways of looking at research quality. One is via citations; one is via the most recent average ERA scores; and one is journal impact. We are working on those as three ways of measuring research quality. On the other hand, we also need a comprehensive measure of teaching quality. That's actually even more problematic to come up with than research quality. But, to put in the appropriate filters, we need quality measures for both.

Ms BUTLER: Yes. So these models that you've provided tell us something in brief about two fairly blunt measures, one being teaching cost per student and one being research cost per output, but there are a range of

factors that would affect both of those that mean that we don't really know much about the output; we only know about the numbers, the volume.

Prof. Houghton: Yes. Based on the government data, yes. We know something about the relative position of different institutions. For example, some of the Group of Eight are at or near the frontier; some are quite some distance away. The rural universities we see clustered in a particular region of what might be referred to as the ecosystem, with one exception, which is much further up towards more research activity.

Ms BUTLER: I guess what I'm really trying to understand is what conclusions we can draw from this, because it seems to me that, to better understand the value of university research and the value of university teaching, the model would need to somehow be embedded with questions of, as you say, the ERAs, the impact and the frequency of citation—to understand the real opportunity cost for a university that decides to spend $1 million on teaching and not on research, and that's the opportunity cost to the nation, not just to the university, of course.

Prof. Houghton: Indeed. Because universities don't currently have a funding model where they can trade to their comparative advantage, you don't get what might be referred to as corner solutions, where someone who is really good at educating focuses to a very large extent on that. The absence of people at either end of the frontier I think is an interesting observation, irrespective of the issue of quality.

In respect of those three measures of quality that we've been looking at—journal impact, ERA score and citations—as yet we have not found those to significantly explain differences in efficiency within the Group of Eight universities. You can see that some are at or close to the frontier and some are some distance away, and yet, if you look at various measures of quality, the Group of Eight do cluster together in many respects over quality, and similarly in some of the other groupings. So we have not yet been able to find the appropriate instrument that picks out the issue of quality. In theory, quality should cost considerably more, but we've not yet found a way of modelling it that—

Ms BUTLER: Quality is inherently difficult, but impact is even more difficult, isn't it, because we can't predict the future impact of forgone research that we didn't do because we spent the million on teaching?

Prof. Houghton: But there is no counterfactual.

Ms BUTLER: Thank you.

Mrs SUDMALIS: I want to go back to the contingent debt. That seemed to indicate that there is a possibility that—forgive me if I got it wrong—if you have the contingent debt there, that could actually act as a carrot to the university to have research that doesn't just land in a publication but lands as research that leads to an outcome, and if it does there's some kind of return to the university, which can then fund the blue-sky research. Did I interpret that correctly?

Prof. Chapman: Not necessarily. What will motivate the researcher will not be patents or commercial activities but the ideas that will lead to publication. There will be many such ideas that will have offsets, implications and partnership potential with a private sector group, or the partner could be government, as the ARC works.

Mrs SUDMALIS: Because the outcome is what will incentivise business and government to invest.

Prof. Chapman: The outcome for business, you presume, is profit.

Mrs SUDMALIS: Or new technology which may lead to that.

Prof. Chapman: Or good publicity, or being seen as good citizens. More likely, they're trying to understand something that is pertinent to the space in which the company or the business grouping or the government is particularly interested in. At the moment it's very hard to get enough financial resources to have those partnerships come through. You don't really know what would happen until you have a scheme like this. That's why I think a pilot is a very good idea.

Mrs SUDMALIS: It's happening in Wollongong.

Prof. Chapman: How is it happening?

Mrs SUDMALIS: And there's quite a bit of private investment there with research and they're actually getting outcomes. There is one, just off the top of my head, with energy efficiency in an aged-care facility. They've got the humanities, the sciences, the business and the university all involved in that project for an outcome which is actually not all about profit. It's all about making energy affordable for the residence in there. My point is that this measures publications, this, that and the other, which, unfortunately in the general community, is not seen to be a good measure for university investment, because it's just another book on the shelf. Forgive me, that's reflecting the outside world, not the inside world. Yes, you need the curiosity for research. I get that. I do have a science

degree, so I know exactly where you're coming from. You have to have that because you just don't know what the next one is, but there also needs to be the ability for you guys in humanities and in social sciences to be able to say, 'If we do this research and this research, there's a possibility of that outcome.' That needs to be demonstrated for any investor, whether it be a private investor or a government investor.

Prof. Chapman: I think that doesn't deny the potential of a contingent debt for both partnerships. You're talking about the output. This focus has been on the funding. What will drive them is what is in their interest, which could include community participation and involvement, being a good citizen or profit. Whatever it is, it's in their welfare function. This idea is here and on the table to suggest that there are different ways of thinking about the funding, which might be pretty attractive to non-university participants. Currently it's not there. The benefit for government is that it can be extremely inexpensive.

Mrs SUDMALIS: I thank you for that. It has been fascinating. I think there will be some really good material coming out from all of your contributions.

Ms BUTLER: Does anybody have anything further that they want to add, which they feel like they haven't had the chance to?

Dr Strelein: I have one point on how we examine research investment in Indigenous research. At the moment, that's a really difficult thing to do. There's been a long argument for the introduction of a field of research code at the four digit level for Indigenous research to reflect the unique nature of that. When we're doing ERA analysis or looking at the impact and engagement analyses or any of those kinds of data analysis, in terms of education investment, we're not able to analyse Indigenous research investment level. It would be incredibly valuable to have that option. As we know, we can split the percentage, so we can still reflect any primary disciplines that are involved, but that's a really valuable contribution that we can make.

Ms BUTLER: How would that be affected? Through the department?

Dr Strelein: I'm pretty sure it's through ABS field of research. There is a process involved, which is why we don't get resistance. It's the ABS and we produce our FOR codes in conjunction with our colleagues in New Zealand. There's a bit involved, but it does mean that we're just not getting that line of sight down to Indigenous research investment.

Dr Higgins: The system isn't broken. We don't think the system is broken. The ARC and the NHMRC are highly professional, transparent organisations that really do well. For block grants and competitive grants, I think the balance is about right.

Dr McMahon: Where there is systemic bias or where that information of diversity is not been captured or rewarded, we see that as an inefficiency in the research funding system and we see that there are opportunities to either streamline processes or maybe reduce waiting on track records to reduce that bias that gets introduced. We recognise, absolutely, that underrepresented minorities have a greater administrative burden, because they have to advocate for their own inclusion and, as you pointed out earlier, that comes at the cost of research and doesn't get captured in the track record currently. So we think there are opportunities to better recognise the additional roles that people are playing and the impact that it has on their research career in a way that can promote diversity and inclusion, which is ultimately much better for research outcomes across the board.

Dr Day: I'll make two quick points to fully endorse Dr Higgins point that the system is not broken. I think we're very strongly of the view that Australian research is of incredibly high quality and the government gets a very good return on its investment from that. The second point I just wanted to reiterate is a recommendation we had in our 2030 plan, which the government noted but didn't explicitly support. It was that the government should make sure that it's long-term funding for research and innovation science does not decline as a share of GDP. I think there is a risk that that might happen.

CHAIR: That has been extremely valuable for us. Thank you to everyone for their contributions. Remember, we do produce a transcript. We'd ask you to check that it's word perfect. That will be made available. This is being broadcast today for the duration of your roundtable, so we thank you very much.

Committee adjourned at 12:01