



# Select Committee on Science and Technology

## Corrected oral evidence: Science research funding in universities

Tuesday 4 June 2019

10.25 am

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Members present: Lord Patel (The Chairman); Lord Hunt of Chesterton; Lord Kakkar; Lord Mair; Baroness Manningham-Buller; Baroness Morgan of Huyton; Lord Oxburgh; Baroness Young of Old Scone.

Evidence Session No. 3

Heard in Public

Questions 17 – 23

### Witnesses

Professor Michael Arthur, Provost, University College London, Professor Sir Leszek Borysiewicz, Chair, Cancer Research UK.

### USE OF THE TRANSCRIPT

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## Examination of witnesses

Professor Michael Arthur and Professor Sir Leszek Borysiewicz.

Q17 **The Chairman:** Good morning again, gentlemen. It was nice to talk to you outside. Thank you for coming to see us today. We are very excited about hearing your contribution, and no doubt you have read some of our previous contributions. We have now officially started the session, so we are now on live stream.

Our main purpose in this inquiry is to focus on the research aspects of universities, where they get support and what effect different policies could have on their ability to develop and deliver on their research. We would like to hear from you on this; you are both experienced vice-chancellors and no doubt will put us right. For the record, please introduce yourselves, saying who you are and what you represent. Feel free to make an opening statement before we start the formal questioning.

**Professor Michael Arthur:** I am president and provost of UCL, where I have been for six years now. For nine years before that I was vice-chancellor of the University of Leeds, and at one stage in the midst of all of that I was also chair of the Russell Group, although that was about five or six years ago.

**Professor Sir Leszek Borysiewicz:** I am emeritus vice-chancellor at the University of Cambridge. I stepped down in 2017 and Stephen Toope is my successor. I am now chairman of Cancer Research UK, which I think is the world's largest fundraising charity. At the same time I am a board member of UKRI, which I think pertains to this area, and chairman of the European Research Council identification committee, which sets the tone for all the panels of the European committees. I raise those three, because I believe they are going to be relevant through some of the discussion that we are likely to have.

**The Chairman:** Thank you. Do you want to make any opening statements about the inquiry or its topic?

**Professor Michael Arthur:** I am happy to say a few opening words. This is a very timely inquiry and it is a great pleasure to give evidence to it.

From my perspective, there has never been a more important time to get this right, particularly as we think about a post-Brexit Britain and how we keep research and innovation prominent in this country. To me, our world leadership position is a fundamental factor, so organising the different funding streams, with the various changes that are going on, is important. I am one of life's optimists and I am sure we can get it right, but we have to work at it very carefully.

**Professor Sir Leszek Borysiewicz:** I would echo a lot of what Michael has said. I am aware that UKRI spends most of its time at present contemplating the relative impacts of decisions being made about the UK university system. The UK university system is recognised globally as one

of the UK's core assets and one of Britain's leadership positions in the world. That is something that we are determined to build on.

Whether we face a Brexit world, whether we face some sort of close association with the EU or otherwise, this will be extremely important. Universities overall, rather than just Cambridge, are now able to take a more global perspective, and at present they are facing huge risks. They are expected to invest increasingly riskily from a university perspective. Safety nets have been removed. New regulators are in place but they do not start until 1 August, so we really do not know how the relationship will develop.

We have the uncertainties of what will happen with Brexit and a totally uncertain immigration policy, and at the same time we are now likely, with Augar, to be hitting universities with yet more uncertainty over their income and finance streams. We have to tread very carefully, because losing the research advantage that our university sector gives us would place Britain in a relatively non-competitive position. We could lose our current much heralded and much recognised international position just behind the US in many areas, as countries such as China, Singapore and Switzerland, which are champing at the bit to overtake us, are doing a lot with a variety of subsidies to continue to attract R&D business away from our university sector.

So I am very concerned. This inquiry is timely because of the huge uncertainties that universities face yet their capacity to influence those uncertainties is negligible. That is the big difference at the moment: the uncertainties are all external to the position that vice-chancellors find themselves in today.

**Q18 The Chairman:** Thank you both very much. My question relates to the QR aspects of funding for research. How do you think the type of research that you undertake will be affected, both in developing research and the research itself, whether that is discovery or basic science, by the QR funding that we hear has fallen in proportion to the research council funding?

As we have heard, that has an impact on universities. Does this affect your ability to develop research in any other ways? From what other sources will you have to find this money if the QR money continues to fall?

**Professor Michael Arthur:** The QR funding is fundamental to the research structure and the general research ecology of the UK. It is funding that gives me, as university leader, and my teams the flexibility to do new, interesting and important things. Obviously it underpins the research infrastructure. It is used to fund equipment and sometimes capital development. It is fundamentally important in making that work, and it fills in some of the full economic cost of research.

However, from no funding stream do we receive 100% full economic costing of that research activity, so in most universities some sort of cross-subsidy is going on. In some places that includes philanthropic

funding, but usually it is a transfer of funds from education to research. From our own figures for UCL, I think we make a very slight loss on publicly-funded teaching, we make a significant loss on research, and on international student recruitment we make a significant surplus. So in effect there is cross-subsidy from teaching to research budgets.

If QR falls further, that will make the problem even more complex, and it will become quite difficult to justify precisely why students from overseas should be cross-subsidising the research activity. In an environment where we are pushing a research-based education, of course international students should recognise that that supports their education through supporting the research activity. Also, of course, UK taxpayers will have paid huge sums of money over many years to create the research infrastructure at a university such as UCL, so some ongoing contribution to that from international students is appropriate.

However, the degree of cross-subsidy is becoming more and more difficult to defend, and QR is a key element of all that. From the national figures that we have, there used to be a ratio of Research England to Research Council funding of around 1.8. That has now dropped right down, so the changes to QR funding are really beginning to bite.

**Professor Sir Leszek Borysiewicz:** I will answer the question wearing four different hats. I will start with the UKRI hat. At the moment, the total QR funding for England under Research England is £1.35 billion per annum. That is 20% of the total UKRI budget, so it is a significant sum of money. There has been a fall, which, if you calculate it, has been due largely to the QR budget being fixed with no inflation allowance since 2010.

You will note that UKRI lobbied government to ensure that QR funding was increased last year by 3%, and our projection is that, over financial years 2018-19 to 2019-20, we will put £108 million more into QR funding. There will be an increase in QR funding because we believe it is vital that we maintain the ratio of 65p for QR to £1 for the research councils. That is the sort of ratio that we are looking to work towards.

This ratio is important because it is not that the QR has fallen catastrophically; if you look at the graphs shown by Michael and a variety of chancellors' speeches, it is because the research council income, which also flatlined for a period of time, has risen by one-off awards made to research councils. That is why the ratio has fallen, and we do not wish to see it fall much further.

The second line is very much from the charities perspective in my role as Cancer Research UK chair. Charities are totally dependent on support through the dual support system that is now enshrined in law under the Higher Education Act. We can support only the activities that are within the charitable mission of the foundation, so we are not in a position to support the full economic costs of the libraries, animal houses and infrastructure of universities, which rightly come under the dual support system.

This is particularly important for the life sciences. Again, if we look at the 2016-17 numbers, the Association of Medical Research Charities put £1.6 billion into this sector; the Wellcome Trust is the big player—it put in close to £1 billion; and, in that same year, Cancer Research UK put in £423 million, which is rising to £500 million this year. The other charities are at around £200 million. BHF is the next largest at £80 million-odd; so there are two very large players in that area. The MRC puts in £800 million, and the NIHR puts in £1.06 billion. Those are the relative sums, and they give you some idea of what any reduction in charity support will do in relation to the full economic cost deficit that universities face.

The third element measures QR from the universities' perspective. As a former vice-chancellor of a university, one of the major functions is to balance the various income streams against expenditure. I am sure that the agreed position is that under no circumstances are you prepared to let the quality of education or of research suffer, because that would be a suicidal direction for an institution to go in.

We both had the privilege—Michael still has it—of leading two of the best universities in the world. How did Cambridge approach this? Cambridge's biggest deficit in terms of real costs is undergraduate education. That is a choice which the university and its colleges make. The costs, which are in the public domain, are about £18,000 per year, £9,250 of which is the current amount that the university can claim back for home students.

Home entry into the student population is 80%, which means that about 10,000 out of the 11,500 undergraduate students at Cambridge are UK students. A fall to £7,250, as suggested by Augar, means that every £1,000 fall per student is £10 million per annum extra which the university has to find. You can see this from the previous numbers for education. If I was in business and looking at the biggest loss-making operation for Cambridge, it would be undergraduate education. But it is our choice to make this a priority and the costs are subsidised because of the unique nature of the education that we choose to provide.

So alongside the colleges we have decided to use the income largely from our endowment to cross-subsidise. That is where the cross-subsidy is occurring. It has enabled the university to take a very principled stance, particularly on international students; we believe that it is morally wrong to take money from international students, who bring their fees to us for their education, and use it as part of the cross-subsidy.

As I said, we are in the fortunate position, as is Oxford, of having a substantial endowment, which other universities do not have, to make up the shortfall and to choose to offer the type of education that we provide. We are not asking for special treatment; we are just saying that those are the facts that Cambridge faces.

The last, and probably the least, element that you may be aware of is that QR is purely for England. I am a Welshman, as you know, and I am sorry but I have to make a plea. The QR available to university colleagues in Wales is much less than it is in England, and at times it is uncertain how it is calculated in Scotland and Northern Ireland, so we have to be careful and recognise that when we refer to QR we are talking about

England alone and that the Assembly Government and the Scottish Parliament have to consider the position in the round.

So while they enter the REF exercise for quality assurance, the outcomes for the individual universities in Wales—I do not know the position in Scotland, but I know it in Wales—are very different compared to those elsewhere in the UK. You might wish to ask members of the Assembly Government why that is and why their funding does not match the funding that is available in England.

**The Chairman:** Thank you very much indeed for comprehensive answers.

Q19 **Lord Kakkar:** Thank you. First, I declare my interests as professor of surgery at UCL, chairman of UCLPartners and director of the Thrombosis Research Institute in London.

I want to explore a little further the position of UKRI funding—in particular, since the creation of UKRI, whether universities have noticed any changes in the types of research that are being funded and the funding levels available through that source of funding since it was all brought under the aegis of UKRI.

**The Chairman:** You must not feel constrained, Professor Arthur, just because Borys is sitting next to you.

**Professor Sir Leszek Borysiewicz:** He never has.

**Professor Michael Arthur:** Lord Kakkar and I know each other well, so it is a pleasure to have a crack at answering this question.

The whole thing that we have been discussing—the ratio between QR and research council funding—now falls under UKRI’s aegis, so it could make adjustments if it so wishes, but it has currently maintained this relatively low ratio. That is important to note.

We have seen the introduction of many more longer and larger grants, which for UCL has been a beneficial change, and we are seeing better recognition of cross-disciplinary research activity gaining those longer and larger grants. That is a positive. The corollary of that, of course, is that the smaller independent small grants, which are quite often the sort of grant that you start your career with—that was certainly the case for me—are fewer and more difficult to get.

The other big change has been the introduction of the grand challenge research fund, which is obviously ODA money. In many regards that is very welcome, but those are the sorts of changes that we have seen so far. There is also an emphasis on doctoral training centres. Again, that has been a positive, although with many of those awards there is a lot of pressure back on universities to match fund, particularly for PhD studentships.

That is money that has to be found from somewhere, and we have already discussed the relative shortfall from QR. That sort of pressure tends to create a bit too much overtrading in research. Most people in my position would prefer better funded, more full economic cost and

therefore, if necessary, a slightly lower volume of research activity. Those are the sorts of changes that we have noticed.

**Professor Sir Leszek Borysiewicz:** From my previous experience of being the head of a research council, steering UKRI is very much like steering a gigantic oil tanker, so any adjustments made at UKRI will take some time to feed into the system. There have been changes, but oddly enough the research councils are more or less conducting their business exactly as they were before in relation to their grant schemes.

We have been fortunate that the Government have allocated £7 billion extra to R&D, which has meant that we have been able to create some very high-profile schemes that have grabbed the headlines and are mostly large-scale funding, which gives the impression of their real dominance in those areas. From my perspective, the real issue is that the project and programmes still continue at the research councils as before, but obviously the attention is focused on these rather large awards.

I reiterate that the QR funding has been boosted in 2019-20 by £88 million, so we are trying to respond, but 20% of UKRI funding is really very large and it excludes additional support in other parts of the UK. What is important is that money has gone in: we put £1 billion into the national productivity investment fund; we have created the strategic priorities fund; we have the strength in places fund, which is being created with substantial sums of money; and there is the industrial strategy challenge fund. Some of those are geared towards the interface between Innovate UK and businesses, so much more of this new money is targeted towards the applied sector, with the research councils continuing to provide the necessary fundamental research infrastructure.

From my perspective, you will see changes, which will be rather more apparent over the years and it has to be scrutinised very carefully. At the moment, though, as a member of the UKRI board I am not seeing changes in the research councils that make them substantially different from when I looked after the MRC as the chief executive. There are administrative changes going on to make them more efficient, but they should not adversely impact research funding.

**Lord Kakkar:** Given the capacity for UKRI to strengthen and consolidate the research base in universities—a point that you said earlier was fundamentally important to the future of science in our country—do you think that UKRI is in a position to target its funding in the most appropriate way to provide that security and consolidation to the university research funding base at a time when we have heard it is under great challenge, or could it do more?

One accepts the very important schemes and initiatives that are taking place, but equally, in a period when everyone recognises that the university system is in potential jeopardy, is there capacity for UKRI to do more in that area as a priority?

**Professor Sir Leszek Borysiewicz:** I think it is about getting the balance right. That is a personal view; you can take it as the biased view of a board member who has agreed to some of the budgets, and I am

very happy to be challenged on that. However, the leadership fund is virtually all directed at creating more scholars, opportunities and positions for young people within the university sector. We are also ensuring that the strength in places fund is about getting universities to work together within the local infrastructure to gain support from local industries. The industrial strategy challenge fund has huge component parts of universities engaging in many of the programmes. In an area that I know reasonably well, the Faraday centre, the universities are benefiting from grants that are coming from the directors of centres in specific areas.

The specific area of providing support for infrastructure and sustainability has to come through QR. It also comes through schemes such as the UKRPIF, which I think has given about £683 million to 43 projects over the last 10 years. These are big-capital investments and capital investments are going in alongside the other grants in support of particular thematic areas.

Can more be done? Of course, but within the budgetary constraints. We also need to ensure that there is good liaison between universities and the business sector to drive our economic well-being as a country in times of national uncertainty. I think we are getting the balance about right, but that is a personal perspective and I know that others might disagree.

**Lord Kakkar:** Professor Arthur, to come back to the question of QR, are the universities in dialogue with UKRI about the appropriate potential balance between QR and other initiatives within UKRI at this particular time with regard to the anxieties that you raise about the sustainability of the funding base for science in universities?

**Professor Michael Arthur:** Yes, we are in pretty constant dialogue. Obviously Professor David Price, vice-provost for research, and his team have close links and they use them. We have sent lots of examples in to Research England about how QR is used; we can provide the Committee with some practical examples if you would like to see them. I agree with Borys; I think he is largely right.

There is one area that I think is not right: where there are national research facilities and significant funding for the revenue for the research, there is no appropriate level of matching capital funding. For the Faraday Institute, for example, £80 million-odd of funding has been distributed, but I have to find the £20 million to put the infrastructure together for the estate to make that work efficiently. That is of course a national facility, not a UCL one. I have been making that point repeatedly to Ministers

**Lord Hunt of Chesterton:** Can you just remind us what the Faraday centre is? Is it just one institution or a whole lot of institutions?

**Professor Michael Arthur:** The Faraday Institute is a collaborative project across multiple institutions, essentially about advanced propulsion and battery technology. That is a very important area for the future of the country. We happen to have a very good team at UCL who are a

significant part of this, but the capital funding for that is absent against what was something like a £12 million award. So I have to find that, and essentially I am funding what is predominantly a national facility. There comes a time when I think that has to be rebalanced.

**Professor Sir Leszek Borysiewicz:** This is because it comes largely under the industrial strategy challenge fund; it does not attract the FEC component that those funds would normally have, largely because they are business-focused and business is expected to put a considerable quantum of the resource into those funds.

I wear a different hat, both at UKRI and elsewhere, in that we challenge all the time on QR in relation to the charity sector. The importance of universities accepting charity funding is that there is a dual support system that is real and tangible when it comes to charity money. We have already talked about the billions of pounds involved, and 92% of that money from the charity sector goes into the UK universities.

The issue here is that if that shortfall continues and the QR is not increased, it makes it less economic for people like Michael to accept charity funding. That puts charities in a difficult position, because there comes a point when, if we do not get high-quality applications, particularly if funding from the EU and the ERC begins to dry up, we will need to start reconsidering reforming our own institutions again, whereas we would rather integrate them very fully into the universities to take advantage of the breadth of experience that universities can offer.

We are pressing all the time to ensure that the QR is truly reflective, and the fall-off from 28% to 20% is quite unacceptable for the charity support component of QR.

**Lord Kakkar:** Have I understood correctly that 28% to 30% of your total expenditure on QR is the appropriate level?

**Professor Sir Leszek Borysiewicz:** It is the charity sector level that it was originally anticipated universities could begin to work with. However, you have to remember that what we are really talking about is the full economic cost deficit of university research, which is close to £3 billion. Not even the full economic cost of research council funding is actually available; it is running at about 72%. Europe is marginally worse at about 69%, if I recall correctly, while charities are at between 61% and 68%.

Those are the sorts of numbers that we are dealing with. So the total accumulated deficit on full economic cost is around £3 billion. Our universities are very good at looking at alternative funding streams. Where Augar makes me anxious is that universities do not use cross-subsidies to education in this area but can continue to raise that sort of resource from elsewhere. Clearly, a reduction in that full economic cost deficit will be vital to keep the finance of universities, and hence the finance of our R&D effort as a country.

**Lord Kakkar:** Is the UKRI position therefore that if any future funding were made available to UKRI, dealing with the full economic cost deficit would be a priority for UKRI?

**Professor Sir Leszek Borysiewicz:** It always has been; we are charged at all times with making sure that the system is sustainable in the longer term. That has to be considered.

However, we also have to remember, in the context of full economic cost, that if we funded all that, you could cut the research council budgets in half and you would then do fewer projects. There is an unwritten compact that people do their very best, but you have to be alert to the opportunities, and UKRI will have a responsibility to look very carefully at where it becomes very burdensome. I know that it is very high on the agenda. You would have to ask Professor Walport where it sits in his priority list, but I know from board members that it is very high in ours.

**Baroness Young of Old Scone:** This point could probably come up in other questions as well. Are you beginning to see any signs of the Government's focus on industrial strategy, the UK's standing in the world and our position as a trading nation and as a competitive nation beginning to exert its influence on priorities as a whole across the research agenda, as evinced by the research council funding or in any other way? Or am I seeing Reds under the bed?

**Professor Sir Leszek Borysiewicz:** Again, I think this is a question of timing. Remember that the industrial strategy challenge fund has been operating for only 18 months and is still getting approval for the wave 2 and wave 3 initiatives under that funding. Many of these initiatives will be in a four-year, five-year or six-year timeframe, so that is as long as it would take before I could honestly answer that question.

We think we have set out on the right track, we think we have made the right decisions, and we think we have alignment with an industry strategy that has sensible major pillars. There will be an ever-increasing pressure to focus on some of the areas where we are globally competitive, but we must not forget—this is why the balance of research councils versus these other initiatives is so important—that we always have to be open to the great new idea coming forward.

That is particularly true, dare I say it, in the arts and humanities, which are so often the forgotten players. Physics, chemistry and medicine tend to dominate the agendas financially, but the AHRC and the ESRC are important, and we are seeing their importance growing ever more into the wider impact that initiatives will have even under the industrial strategy challenge fund. We are well set to be able to see this go forward. We need continually to monitor it and adjust it, but in principle we are on the right track.

The anxieties are rather more external. A general perception from my travels around the world—in India, Hong Kong, Singapore and many countries in the Far East but particularly in central Europe—is that our global position is being influenced by the general feeling of isolationism pervading the UK. The drawbridge is being pulled up and we are going to become more internally focused rather than externally.

I know that the UKRI board is very aware that we have to keep this international openness right there. That means that whatever the

outcome of EU negotiations and whatever systems we begin to adopt, we have to be open internationally. For that to take place, I am afraid that the Immigration Rules are probably even more important than the actual position on what happens in relation to the EU. Are we an open country that will participate in global research programmes, or are we pulling up the drawbridge and saying, "We're brilliant at this, but actually we'll just do it in the UK"?

If we take the latter course, my belief is that we will get left behind. Science in particular, but also I think the humanities, is now a global entity, and I do not know a single academic who feels constrained to being in England, Wales or Scotland; they look to the best collaborators and participants around the world. So, yes, I think we are on the right track, but that depends on how open we are to all the global influences and on our remaining a global player whatever the outcomes of the negotiations over the EU.

**Baroness Morgan of Huyton:** My question follows on from the previous question and answer. I have listened very carefully to what you have said. Do you think it is fair to say that there is at least a perception or communications problem with UKRI: that the noise is about the challenge funds? We have had evidence in previous sessions from people saying that that is where all the focus is.

Even a little in what you have said today, there could be a slight perception that the research councils are happily pottering on and doing their thing but the noise, the concentration and the political focus are all on the new challenge funds, which by their very nature are relatively inward-looking because they are about building Britain rather than building our science base for the world. I just wonder whether there is enough conversation at board level about that.

**Professor Sir Leszek Borysiewicz:** There is a lot of conversation. Dare I say it, the recent appointments and changes in the communications department are really important. We have to ensure that we are fully engaged with the academic community. It is the bedrock of Britain's success, and it has delivered time and again. We need to deliver again, and I mean the complete academic community, not just the scientists in this regard. We have world leadership here and we all know the quality of the staff that we have, and they can play a full part, but sometimes we have to be careful that the perception is not that all we are interested in is applied research.

**Baroness Morgan of Huyton:** That is the problem.

**Professor Sir Leszek Borysiewicz:** Is there some work to be done there? The answer is yes. Are we on to it? I think we are. Will we get it right? I am sure you will tell us if we do not.

**The Chairman:** We need to move slightly more quickly, because we want to get on to the important subject of the Augar review. Michael, you had a comment to make.

**Professor Michael Arthur:** The added secrecy that has surrounded what might happen with Brexit and what UKRI and the research councils

might do has been very unhelpful, and I have made that point to Ministers. It is time to be more open. That has been part of the communication deficit.

I was going to give a yes/no answer to Baroness Young. When we designed what was going to go into UCL East, our new development in the Olympic Park, we did not know what was in the industrial strategy, but it turns out that 60% of what we are proposing to do quite closely matches that strategy. That, of course, is because the academic community is responding to the same set of signals as the government department. So I think there is some alignment. As soon as you create the scheme, academics will always chase the money if it gives them the opportunity to do what they want. It is definitely a bit of yes and no.

**Q20 Lord Hunt of Chesterton:** I am very pleased that you have mentioned UCL East, which I understand also has dealings with the V&A, which is the point that you made.

**Professor Michael Arthur:** Absolutely.

**Lord Hunt of Chesterton:** My question is what challenges the universities face in collaborating with industry and other external bodies. One of the things about the UK is that, compared with other countries, we have lost many of our governmental laboratories. I was head of the Met Office at one stage. That seems to have survived. It has been a very important point.

All the other European countries and the United States have very substantial laboratories. The vice-chancellors' argument is that in the UK we are doing it ourselves in some sense in the universities. Since we have lost the actual institutions, is there an overall structure of collaboration in the networks, which are substitutes for governmental research laboratories?

In a way, you have been describing initiatives from the universities. Are we compensating for no longer having these national institutions? Is that sufficient?

**Professor Michael Arthur:** It is a tough question to answer. Some national laboratories have closed, but other national institutes have opened, such the Crick and the Turing. There has been some rebalancing. Wherever possible, we collaborate very actively. We are a founder partner in the Crick and a significant partner in the Turing Institute. Collaborative activity occurs.

If your question was aimed more at the challenges of collaborating with industry, this is obviously an international marketplace, and industry can turn to wherever it wants in the world to get the research and development that it needs. It is quite often very specific to individual academics and the connections that they have made over many years. UCL computer science, for example, has a very significant partnership with Cisco, and we manage this very actively. It is accelerating because of the evolution of artificial intelligence research, the sort of very

fundamental research that we can do in a university and that eventually becomes commercialisable.

It is a mixed picture. It is certainly incredibly competitive. Are universities flexible enough? There is quite often an expectation of some university input into a development when it is collaborative with industry. That is another area that calls on funds and is tricky because of timing issues, et cetera.

**Professor Sir Leszek Borysiewicz:** This is a key component of the United Kingdom's future success, as far as I am concerned. I refer you to the NCUB's *State of the Relationship* report for 2018. There is also a report coming out in 2019 on the nature of the relationship between university and business. The 2018 data showed that in 2016, when the sums were available, small and medium-sized enterprise interactions rose by 11.4%, but large-company interactions fell by 6.4%.

What was more worrying for me as a UKRI board member in reading that report was that Innovate UK awards to the university sector fell by 21.9%—a big fall. That was before Innovate UK was brought under an UKRI system. We are thinking about how Innovate begins to support universities in this direction.

Different universities have different approaches to this. The diversity of the universities' approaches is fundamentally important, particularly in relation to the small and medium-sized enterprises. I will not dwell too much on the Cambridge data, but we are talking about 4,500 companies and 60,000 jobs being created in the area, all in the high-tech space. Microsoft, Apple and all the other major companies are coming into the sector. AstraZeneca moved its global headquarters there. These are all fantastic success stories.

How we sustain that is important. The biggest challenge here is enabling the growth from small to medium-sized enterprises. It is absolutely fundamental. Far too many companies are being bought out at the small level for £60 million or £70 million. We are not growing the Googles, the very large enterprises, which is a challenge that BEIS ultimately has to deal with.

Sherry Coutu's report on growing from small to large is very important. Universities need to be part and parcel of that enterprise, very often because they are the central lock by which international players come into the UK because of the talent embedded in our universities and their remarkable success records in R&D.

I come back to one other area that is forgotten time and again: the importance of the humanities and the arts as companies begin to grow into that sphere. Having an energy policy is one thing. Making sure that people will work with that policy and understanding people's reaction to it, sometimes asking what the best way to deliver is from a humanities perspective, is very important.

There is a reason why this strikes home. In Sierra Leone, there was a wonderful building project to put up flats in the slum area of Freetown. If any of you have ever been there, it is pretty shabby. You go there a few

years later and find people living in the grounds because nobody had asked them what sort of building they wanted to live in. They did not want to live in a high-rise building that was partly completed but in their own cultural setting. We have to take the cultural setting into account and use our assets across the universities, but there is a responsibility to look very hard at how well universities and business interface under Innovate UK and these new schemes.

I hope we will soon get data for 2019, which, with the first years of 2017-18, will give us a better picture of whether we are on the right trajectory.

**The Chairman:** One assumes, though, that the universities' ability to form partnerships with industry will depend on the quality of research in that industry's particular area of interest and the university's ability to deliver on that. What do universities have to do or invest in to make that possible?

**Professor Sir Leszek Borysiewicz:** From my point of view, it is about investing in quality. I am sorry, but I am a great believer that, fundamentally, if you can attract the very best people, they will tend to deliver the very best outcomes at the end of the day. Take the example of monoclonal antibodies in humanisation; that did not come about because somebody sat there making a strategy but through supporting excellent people who were able to build up an idea that thereafter became global.

It is very important that universities have the flexibility to appoint staff in what is a very competitive world out there. Britain has to continue to attract the very best young investigators on a global scale. I am sorry, and appreciate that this is not universally agreed, however, we must not only attract but also seek to retain them in the United Kingdom, so that the benefits of their expertise accrue to the United Kingdom at the end of the day.

It is quite often an irritant when you see people doing great work during their PhDs and disappearing. You know the benefits of that will go elsewhere. I am sorry, but I will bleat on about how the immigration policy will be fundamental to our continued success.

**Professor Michael Arthur:** I completely agree about the people, but they will not come to a vacuum. We must have flexibility, be agile and move fast to be able to create new facilities and to provide the appropriate equipment for them. Space and estates infrastructure also become part of that picture.

One reason why we went to UCL East was that, at UCL, if some big industrial company came through the door and said, "Michael, I would like to spend £20 million on this area of research, which your university happens to be very good at", I would have had to say no, because we had no additional space whatsoever. The need to build new facilities was therefore so obvious. It has to be the total package, otherwise you do not get the best people coming.

**Professor Sir Leszek Borysiewicz:** I would echo that. Cambridge is doing exactly the same in moving out to sites where we can expand. I entirely agree with Michael's position.

Q21 **Baroness Manningham-Buller:** I have to declare that I am chair of the Wellcome Trust. I am also on the advisory committees of the Royal Society and the British Museum.

How do you see the relationship between publicly funded research and non-publicly funded research working? What is the effect of one on the other, or indeed is there any effect at all?

**Professor Sir Leszek Borysiewicz:** A very direct effect that we know is that for £1 invested in research you get benefits to the economy of around 25p per annum and 20p coming in from other sources. Therefore an investment, be it public or charity—the data pertains particularly to charities—is actually very good. For me, that is one of the major arguments for why QR delivers a return to the UK by supporting work coming in from the charity sector.

It is important that the charity sector, particularly in the biomedical field, engages closely with the programmes that are there but keeps a distance to ensure that bodies such as the Wellcome Trust and Cancer Research UK can still support different areas of science, because gaps are always left behind in the system. The fact that different initiatives and directions are coming at this gives us, as a consequence, a diversity that makes Britain much stronger than, say, countries where it is virtually all state-funded in a variety of ways.

**Baroness Manningham-Buller:** But have you observed that if you attract government funding—MRC funding, let us say, although you have been very clear in emphasising the importance of the other research streams, including the humanities, which I would endorse—it follows that you are more likely to get charitable funding? I was working out those relationships. I absolutely take your point about the economic value that it delivers.

**Professor Sir Leszek Borysiewicz:** From a CRUK point of view, I see it as the other way round: if someone has CRUK funding, they may go on to get funding the other way. So it is very much a two-way street.

Sometimes charities can kick-start an area of research which we can then take to a particular point. A substantial project or programme grant can then become a new thematic area for ICSF or other directions. There is a synergy here. It is not just a one-way street. There is very much two-way traffic, and maintaining communications between UKRI and other funders is the key component.

**Professor Michael Arthur:** I can give you a very practical, worked example of exactly what you are asking about: the UK Dementia Research Institute, the central national hub for which is now at UCL. That was a large MRC award that immediately leveraged £100 million from the two major Alzheimer's charities, the Alzheimer's Society and Alzheimer's Research UK. All of that attracted philanthropic interest, and we have

now raised over £30 million of philanthropic support towards that entity. UCL is also contributing. So what started out as a series of ideas has turned into a national effort of nearly £500 million of investment in dementia research.

**Professor Sir Leszek Borysiewicz:** I am taken with the issue that charities working together can set up quite important innovation funds to enable universities to tap into them. The Syncona arrangement, whereby Wellcome is the major partner alongside Cancer Research UK, gives a great opportunity, to provide support for new developments and opportunities for start-ups in the university sector.

**Baroness Manningham-Buller:** For the benefit of the rest of the Committee, I shall just explain that Syncona was a privately funded company that was started by Cancer Research UK but is now a public company, in which CRUK and Wellcome have shares but do not have control.

**Professor Sir Leszek Borysiewicz:** Agreed. They do not have control.

**Baroness Manningham-Buller:** There is something that I am searching for here. Borys, you said that UKRI and Wellcome—I obviously have a vested interest here—are working closely on this. From my perspective, each of us has an agenda and our own priorities. Do you think we are missing something?

**Professor Sir Leszek Borysiewicz:** I believe very firmly in diversity. Having separate agendas matters. You have to look for a conjunction of agendas where real synergy can develop. For academic communities, the more diversity you have, the better. I remember from when I applied for grants that your first one is often unsuccessful, but the capacity to improve it and go to another funder who will look at it with a fresh pair of eyes offers young people huge opportunities to get on to this rung. Yes, working together is important.

From a CRUK point of view, I would very much want to keep the charity as a separate entity with a different mission and funding stream, but we will work with the NHS wherever we can to really improve healthcare or whatever, just as we work with the Wellcome Trust or other major funders. I dare say that one advantage charities may have in the future is that we can work with the EU, whatever remains as a consequence—

**Baroness Manningham-Buller:** They have something called independence, which is rather lovely.

**Professor Sir Leszek Borysiewicz:** —because of the independence that we have. I value that independence and diversity, but I will also strive to work to create synergy where it is in the interests of the UK and the university sector.

**The Chairman:** We move on to the important aspect of the Augar review and the implications that it may have for research aspects of universities.

Q22 **Lord Mair:** We have touched quite a lot already on the Augar review in relation to the loss of income to universities and the potential effect of

that on research. One of the recommendations of the review is that the teaching grant attached to each subject should more accurately reflect the cost of that subject. What are your views on that? How might the differential between different subjects affect the universities?

**Professor Michael Arthur:** The first thing to say is that we tend to think of these budgets in silos—teaching funding, research funding and so on. However, when they come into funding an academic entity such as a school or a faculty, they merge and become a single budget. That is then spent in order to create the greatest academic excellence in both teaching and research. Somewhat inevitably, if any component of that funding is disturbed it has an impact on all the rest. If you disturb the teaching funding, that has an impact on research.

Secondly, it is fundamentally important to the future of UK higher education that Augar's recommendation that the gap is filled by government funding comes into being. There is a lot of doubt about whether a future Government, and particularly the Treasury, will play ball with that. In fact, last week Jo Johnson tweeted that there was no way the Treasury was going to fund the gap and that it would end up being a cut. That would be quite devastating. For UCL, that cut equates to £40 million a year, the best part of 19% of UK teaching funding.

On the idea within Augar that you can then redistribute government funding and top up different subjects to different degrees, I do not think he entered into how that would happen—I think he is handing it to the Office for Students to come up with the formula—so at this point we are quite worried, and we are very worried about what happens to arts, humanities and social sciences funding. If the total amount of money coming to UCL is the same, and if I have the flexibility to run the university to the best of my ability across all disciplines, there could be some cross-subsidy from A to B. I do not mean band A or band B, but from one part of the university to another.

To an extent, that already happens the other way round: because there is inadequate funding of science and of clinical bands B and A, at the moment my social science and arts and humanities departments are overperforming in supporting those other subjects. So we may need to turn that around, but I would not wish to see any impact on arts, humanities and social sciences. That would be a disaster for the country, because we need that research and teaching capability if we are going to be the successful country that we want to be.

**Professor Sir Leszek Borysiewicz:** I echo much of that. I have two perspectives on the arts and humanities that I feel strongly about. I do not like the suggestion, as I read that chapter, that there will be some additional formal register of which courses are taught at which universities, course by course. At the time the Higher Education Act was coming in, there was a debate about the idea that courses that were substandard could suddenly be closed down by the department. I will certainly watch very closely so that this does not have the same effect by the back door.

I wish I could predict which disciplines we will be leading in 20 years' time. As you know, Lord Mair, artificial intelligence was nowhere in the 1970s and 1980s. Now, anyone who is studying that course after a PhD will be closer to being a millionaire than anyone in life sciences and certainly anyone studying history. So it is extremely important that we keep diversity.

The bottom line for me is that universities are far closer to the customer base—to use that awful terminology—and can be more responsive, than any centrally created behemoth that will define the disciplines that will create the country in the future. You can steer, begin to adjust and put incentives in. I would be very worried if the alternative was a set of diktats that these are the A disciplines and the rest are the B disciplines, because we will do what he is trying to avoid doing, which I laud the Augar review for, which is the focus on the 50% of people who do not go to university.

That aspect of the report was extremely important, because as a country we are missing out on ensuring that education in a vocational sense is adequate. Creating tiers within that other 50% will not be of benefit. If the university sector does not get this money back, that will cause problems, and it is no good pretending that it will not as universities have to balance their books and manage their risks accordingly. It will have to reduce the appetite for risk in any institution as to what it will do.

I will add one more thing. Disciplines that are very often protected in our larger universities could literally disappear. For me, when vice chancellor at Cambridge, such a discipline was Sanskrit. There were only three or four academics and an occasional PhD student, in these studies yet were it to disappear then it would be a devastating blow to Sanskrit scholarship in the United Kingdom.

Universities shoulder the responsibility of trying to maintain a totality of expertise for the UK in a variety of disciplines. If financial pressures such as this are introduced, are we saying that Sanskrit is of little value when we do not know what we may learn from Ayurvedic philosophies? We have to keep the breadth if we want to be a global player in these domains. I worry that some of these pressures might begin to constrain that breadth in the future.

**Baroness Morgan of Huyton:** I will pick up on another aspect of the equation.

We talked about arts and humanities and social sciences being subject to pressure. It seems that the assumption in the Augar review—in a way, we had this with regard to UCL this morning, which I completely understand—is that we can just up the number of international students and it will fill the gap.

I have two questions. First, what is your view of how much further we can push those numbers without skewing some courses and the countries from which students are coming? Is there a danger of it shifting—I am putting words in your mouth, and I apologise—from being a healthy part of the student community, which makes it vibrant, to just being

something like a cash cow?

Secondly, I was interested in the case the other day of the student who said, "I'm not getting a fair education". There is the quiet but growing issue of students as consumers, in a sense, saying, "I'm not prepared to be a subsidy for someone else any more". How much do you see that emerging as an issue?

**Professor Michael Arthur:** That is an important issue, but there is no good evidence base on which to give you a formal answer other than gut feeling. At the moment, UCL runs at 30% international, 15% EU and 55% home. I have said that I would start to worry if we ended up with over 50% international and EU. We are a British university and we have a responsibility to the country. Undergraduate, postgraduate and PGR, we are an engine for the future growth of the UK. Of course, many of the international students who come to us have a great time. They get a very high-quality experience and they enjoy the diversity; for many of them, it is the first time they have met people from other countries and certainly from the UK.

The one point I will make is that it is highly creative. If you get people from very diverse backgrounds tackling the same problem, you get explosions of ideas and you make progress. But if you stretch it too far, it can backfire on you. I am forever grateful that UCL is in London, because that is an incredible factor in people wanting to come and study with us. However, that is not going on across the country.

We are doing a lot of work at UCL to try to diversify our international market so that we are not overly dependent on China. However, last year we had a 36% increase in applications from China, of very high quality, to come and study at UCL. So the marketplace is heavily skewed towards China and some other countries in the Far East, but we are trying to manage it so that we are not overly vulnerable. Between 10% and 15% of our student body—I can get the exact figures—is from China. That is a significant amount of annual income, and one has to worry that at some point that might be a problem.

**Professor Sir Leszek Borysiewicz:** My bigger concern is probably the overall quality. It will probably not be an issue at an institution like UCL, because I know that it puts quality first, but if you are trying to stack up numbers, it will be an issue.

The other uncertainties faced by the university sector, particularly the humanities, relate to the EU. This is not about Brexit, but it is important to realise that while the humanities sector is financially much smaller than the sciences sector budgets that come from the EU are critical, e.g. 39% of all available research funding for archaeology comes from the EU. You start to see that our arts and humanities sector is very dependent on what comes in, particularly from ERC awards. Again, the international domain here is often linked to studentships that accompany those, because those disciplines are very much more people-dependent than facilities-dependent. A perfect storm is potentially brewing here, where the combination of the two might cause problems, even for an institution like UCL or Cambridge.

**The Chairman:** Michael, you said that one answer would be to increase the number of international students to compensate, but presumably that has its problems too, because the fee levels contributed by international students would be much higher than those contributed by the UK students. What particular impact do you think the Augar review will have on your ability to develop research in areas that may not be currently developed, particularly if the Government do not fill the gap?

**Professor Michael Arthur:** Just for the record, I do not think I said that. I think it might have been Baroness Morgan who commented that we would simply replace them with international students.

**The Chairman:** Right.

**Baroness Morgan of Huyton:** I could be accused of putting words in your mouth, yes.

**Professor Michael Arthur:** It is an option, but not an automatic one. It certainly will not work for the whole sector. It might work at UCL. Whether we would want to do it will be—

**Baroness Morgan of Huyton:** Sorry to interrupt, but it has been the assumption among some Ministers. Some politicians' initial comments very much say that.

**Professor Michael Arthur:** It is an option. At this point it also intersects with what happens to the fees regime and access to loans for European students in the future. We have just heard that for 2020-21 we will be under the same regime that we have run throughout our membership of the EU, but it is what happens after that which is a big issue.

It comes back to what we said at the beginning. If the funding of home students is decreased, as suggested by Augar, and there is no government replacement, you can anticipate the research suffering. Students coming will still expect an education, and most academics will prioritise that above their research, so it comes back to the fact that these merge into combined budgets that are then used to staff and run an academic unit.

Any reduction in the fee will have an impact on everything that unit does. It will certainly have an effect on the education; it will be really difficult to maintain low class sizes and low student-staff ratios, and it would impact on the amount of time that individual academics have to conduct their research activity.

**Professor Sir Leszek Borysiewicz:** I am more concerned that the quality of the education might be falling. In the report, Augar points out that there has to be a TEF review, because TEF may not be fit for purpose in this area. We are talking about a regulator that does not have the objectivity of measures of quality assurance on the teaching side to be able to scrutinise and to say, "Has the quality fallen or not?" There is no benchmark against which that can be ascertained.

It is not an easy question to answer, but I am concerned, because ultimately our capacity to get the best students and the best education possible is the best long-term support that we have for our R&D. That is

the resource that so many companies and external players will want to come to the UK to tap into. I am afraid that a fall in quality of education is just as worrying in the longer term for research.

**The Chairman:** The last question may be unfair to ask you. None the less, knowing both of you, you can deal with difficult questions.

Q23 **Baroness Young of Old Scone:** I declare an interest as chancellor of Cranfield University and incoming chair of the Royal Veterinary College.

We have talked a bit about Europe, and particularly the concerns about immigration, but I want to finish by asking whether you think that the current situation of uncertainty, and the possibility of crashing out, are already having an impact on student recruitment and research in UK universities.

**Professor Sir Leszek Borysiewicz:** Yes, is the simple answer. We have seen this over two years. The reports from the national academies in particular in 2017 point to the fall in the number of UK participations or even invitations to lead joint programmes in the EU. There has been a substantial fall in the number of awards. You have to remember that the top four institutions for ERC awards, for instance, are all UK institutions. Combined, Oxford, Cambridge, UCL and Imperial should bring in more than CNRS does to France.

We are incredibly competitive in that European arena. The fact that we do not know what may be necessary to replace that, the costs of that replacement and the nature of what associate status within the EU may hold is a real anxiety. I will echo what I have said before: it may be even more of an anxiety for the arts and humanities than for the sciences.

I have a further problem. Normally in research, when the going gets tough and there is any constraint on budgets you tend to see an increasing polarisation to a smaller number of institutions, and there I worry. What is the optimum number? What is the base of the pyramid that we need to have? We have specialist institutions such as the one you lead at Cranfield. We have institutions that are necessary because they bring in the PhDs. Even the top institutions and the very focused institutions in the UK cannot succeed if we make the base so narrow that the number of PhDs and post-graduates feeding through the system is not going to give us a competitive edge in the future.

We have a position of total uncertainty as to where we are on the EU. I notice the comments that were sent to us from Louise. You have to be very careful of those. I think they refer mostly to the European Research Council, rather than the EU as a whole. You could not say that the EU budgets support disproportionately early investigators; ERC and Marie Curie budgets support them, EU budgets do not. EU budgets are far more focused and targeted, maybe even more than some of the UKRI budgets are at present.

In essence, it is our standing, and as a consequence the way we are perceived, that determines whether we can genuinely engage in an international competition that we are currently winning—60% of co-

publications internationally now occur not with the United States, but with other investigators in EU countries. Will some of that continue regardless of the settlement? The answer is yes, but why jeopardise something we are already well ahead in?

We are contributing to Adrian Smith's report, from a variety of sources, the view that the academic sector is almost unanimously of the opinion that the closest possible association with the EU is the only solution capable of sustaining our R&D excellence, to demonstrate to the rest of the world that we are open for business on the R&D side and able to grow as a country.

**Lord Hunt of Chesterton:** You keep talking about the EU. The point is that across Europe there are existing networks that feed in, and indeed some of them are further outside, such as Israel. I have a vested interest in that I helped to set up a European network in the 1980s that continues. The only trouble is that the network is not as sufficiently engaged with the UK as it is with other Europeans. That is what we must think about and indeed what we must be very enthusiastic about. We should not wring our hands and say, "EU funding is going down". We should work hard on our existing networks.

**Professor Sir Leszek Borysiewicz:** That is correct, but we also have to recognise how the other partners in those networks view the United Kingdom at the present time. In my role as chair of the ERC identification committee, it is clear that there are no more members from the UK on its science council. Our panel members have virtually disappeared, and with that our chance to influence the direction of a substantial amount of funding to which Britain, as an associate, may well need to contribute.

We will have ground to make up. I have close ties with Poland, Slovenia, Slovakia and many other central European countries. When I talk to them, it is clear that because of this uncertainty that may no longer be the first country they will contact. They do not know how we are going to react. They have no idea what support we will get from the Government in these interactions, because we have put these networks in Europe into a limbo land. These activities will be vital in the future but current lack of a position as to the future tends to discriminate against our participation in them. I do not think that the Government themselves actually know what is going to happen in the sector.

The EU is an important source of funding for the vast majority of these networks, but we have changed the perception of how the UK is viewed in many of them. That is the part that bothers me. Ultimately, the Government will decide what they decide about the EU. What worries me is that we have to do the best we can to minimise the perceived or real damage so that we remain the competitive place in which to do R&D in Europe.

That means being global in outlook, collaborative in spirit and prepared to engage. If it is the EU that we are engaging with, we should collaborate regardless of those settlements. That goes equally for the United States and China. We have to look at this on a global basis, which is why my obsession remains with the immigration position and the chance to

recruit people to the UK. That issue will possibly be more damaging to the UK over the long term than whatever solutions we may reach with the EU.

**Professor Michael Arthur:** In addition to the co-ordination of the big partnerships, the other concern has been the impact on the recruitment of researchers early in their careers. We noticed this quite early on. We have a prestigious scheme to attract these researchers, and normally we would expect about a third of the applicants to come from other European institutions.

Last year—for the first time, I think—we had no applications at all in that category. We looked at other HR figures which show that the number of Europeans applying for early-career research posts has fallen from 25% to 20%. While we can still recruit, we do not know whether we have lost the top 5% or the bottom 5%. We have also looked at the leavers. One third of our post-doctoral research staff community is from Europe, so one would expect one-third of the leavers to be European. That was the case in the year of the referendum, but in the following year it rose to 37% of leavers, and the year after that it was 40%. I have no idea where they are going. For all I know they may all have gone to Cambridge. However, that is a much higher percentage than you would expect from the raw numbers.

One of the reasons why UCL is so successful is that for 20-odd years a lot of people have come from Europe and have literally given their lifetimes of scientific expertise to the university and to this country. They are now senior professors. Almost all of them came to this country as PhD students or early-career researchers. I am deeply worried about losing that pipeline of talent for the UK, and I agree with Borys that what will definitely make that worse is if we do not have the correct Immigration Rules that make it easy for that group to continue to come here and stay here, and for their families to have a life in this country. That is fundamentally important.

Finally, in preparation for this meeting, I asked my European office to look at the publicly available data on research co-ordination, which I will be happy to make available to the Committee.

**The Chairman:** We would be very grateful if you did so.

**Professor Michael Arthur:** I will show you this graph, which clearly shows the downward trend since the date of the referendum. It shows that the number of co-ordinations has fallen by more than 50%.

**The Chairman:** We will be pleased to see that document. I have let the session overrun for obvious reasons because you have both had a lot to say and we have had a lot to listen to. Thank you both very much for coming to see us.