

Evidence for the House of Commons Select Committee Inquiry “Leaving the EU: Implications and Opportunities for Science and Research”

1. What the effect of the various models available for the UK’s future relationship with the EU will be on UK science and research, in terms of:

Collaboration

Successful collaborations occur when scientists in different laboratories work together to move their research forward by investigating common research questions and sharing resources and information. As a result of the increasingly multidisciplinary nature of science, particularly of life science, collaborations are now an essential part of any research programme as the sheer breadth of skills and expertise required by many multidisciplinary projects means that it is often very difficult/impossible to obtain these locally. Due to greatly improved communications and globalisation, collaboration between individual scientists, scientific teams, institutions, facilities and organisations in different locations is now possible on an unprecedented scale. The UK has greatly benefited from close working relationships with EU colleagues, where it is now commonplace for UK researchers, not only in universities but also in industry, including the pharma and biotech industries, to have strong and effective collaborations with colleagues throughout the whole of Europe. The strength of these collaborations is evidenced by the fact that 60% of the international co-authors on UK research publications are from the EU [Universities UK (2016)]. This close working is undoubtedly greatly facilitated by the geographical proximity of Europe which enables rapid travel between collaborator sites.

For a whole variety of reasons the outcome of the BREXIT referendum is going to be immensely damaging to both established collaborations as well as potentially new collaborations. Indeed, already UK researchers are losing their “preferred” collaborator status with many of their EU colleagues where the uncertainty around funding means that EU collaborators are less willing, and in some cases, unwilling to work with UK researchers. Indeed many GB collaborators are already reporting that their EU collaborators no longer wish them to be the principal researcher. One immediate consequence of this situation, is going to be a reduction in scientific output and in value for money. In this context it is worth noting that the UK currently coordinates more EU2020 projects than any other EU country, and as a consequence has benefited disproportionately from EU funding [Universities UK (2016)]. Furthermore, in the area of health research, the UK is a net recipient of EU funding, accessing more funding per capita than any other country. Many biotech companies have significantly benefited from Horizon 2020 and its predecessors. As a consequence, leaving the EU will leave a significant research funding gap in this area. Coupled with this is the fact that the EU research funding currently represents the largest fraction of UK’s international research income.

As a consequence, it is essential that the post-exit arrangements are sensitively designed to ensure the least damage to scientific collaboration, allowing current collaborations to thrive and future ones develop as there is a serious danger that unintended consequences may irreversibly damage UK sci-

entific competitiveness. Indeed recent statistics show that the UK punches above its weight scientifically and maximises the efficiency of every pound spent on research – with less than 1% of the world’s population, the UK generates 8% of the world’s scientific papers and has 16% of the most cited papers globally.

In summary there are three main issues: reduced international collaboration, reduced non UK research income, and reduced high quality outputs.

Mobility of Researchers

In order to maintain research excellence in the life sciences and other areas of science, it is essential that the inward movement of highly-skilled scientists and researchers to UK universities and industry is maintained to ensure that the UK is able to employ the best scientists and researchers. In fact only 62% of the current UK academic staff are native to the UK, while 23% are from the EU, the remaining 15% are from wider afield [Universities UK (2015)]. Indeed EU and overseas scientists are essential to staff UK universities. The UK has a reputation for being welcoming to non-national workers. It is this welcome that has enabled the UK to punch well above its weight in life science research, as evidenced by the UK’s high standing in many of research excellence indicators, when compared to many other developed countries who invest much more in their scientific endeavours. Indeed, according to recent statistics from the Times Higher Education, the UK has half the world’s top 10 medical research universities, and has been responsible for the development of many world leading ‘blockbuster’ drugs. This important advantage will be lost if the mobility of highly-skilled scientists and other researchers from the EU becomes more difficult. In addition, EU funding organisations may decide to invest their time and money in non-UK locations where the access arrangements for their scientists/researchers are more favourable. As a result, there is a serious risk that the UK will lose significant research income, mainly from the EU, although there may be knock on effects with our International collaborators who will view the UK as a less dynamic/exciting place to work.

Just as it is essential to maintain the inward movement of highly-skilled scientists and researchers, it is just as essential to maintain the outward movement of highly-skilled scientists and researchers from the UK to work abroad and thereby to ensure collaboration is nurtured and facilitated on the European, and indeed the International stage. Travel is essential in order to facilitate discussion amongst collaborators as well as to disseminate research findings and to build on existing and to make new networks. Employment of UK scientists abroad allows them to develop new knowledge, skills and expertise. Upon their return to the UK, the sharing of the new skills, knowledge and expertise they have gained will benefit colleagues in the UK. This bi-directional exchange of talent, knowledge and experience is essential to the UK, EU and International skills base, and will ultimately build into economic benefit for the UK.

Going forward it is important that the new arrangements for the exchange of highly-skilled scientists and researchers should be proportionate and not onerous and must support the ability of scientists and researchers to work in academic institutions and industry, both in the UK and abroad. It goes without saying that the more difficult it is for a non-UK scientist or researcher to gain permission to

work in the UK, the less attractive the UK will become as a place to work. In this respect, the current BREXIT situation presents the UK with an excellent opportunity to simplify the current immigration requirements and allow highly-skilled scientists and researchers from recognised institutions, organisations and industries overseas to work in the UK and, as a consequence, bring significant benefit to UK science and the economy from their scientific and technical knowledge, skills and experience.

In summary the main issues are that if BREXIT reduces the mobility of EU researchers into the UK it will reduce our capacity to do high quality work, and if it reduces mobility of UK workers to EU countries it will reduce opportunities for building high level collaborations and sharing knowledge. Any new arrangements must not result in such reduced inward or outward mobility of scientists and researchers.

Mobility of Students

The current undergraduate and postgraduate students are the next generation of highly-skilled scientists and researchers. In this context, EU students already make a very important contribution to UK society and the economy. Data show that EU students currently comprise 1 in 20 of all undergraduate, 1 in 12 and 1 in 8 of all postgraduate taught and research students, respectively, although there is evidence that the EU fraction of undergraduate students is even higher in the STEM subjects. [<https://www.iser.essex.ac.uk/files/news/2016/brexit/brightest-best-graduates-eu.pdf>, (2016)]. Additionally, these EU undergraduate students are of high quality and are 50% more likely to gain a first-class degree than their UK counterparts and are more likely to go on to postgraduate study. [<https://www.iser.essex.ac.uk/files/news/2016/brexit/brightest-best-graduates-eu.pdf>, (2016)]. This information is significant in light of a recent UK Commission for Employment and Skills report that states that 43% of vacancies in STEM roles are hard to fill due to a shortage of applicants with the required skills [High level STEM skills requirements in the UK labour market, UK Commission for Employment and Skills (2015)]. If the UK loses these high quality EU students, graduate recruitment in the work place, including the pharma and the biotech industries, will greatly suffer. Indeed the Association of British Pharmaceutical Industries in their report Bridging the skills gap in the biopharmaceutical industry: Maintaining the UK's leading position in life sciences [http://www.abpi.org.uk/our-work/library/industry/Documents/Skills_Gap_Industry.pdf, (2016)] stated that pharmaceutical companies were already struggling to recruit for highly skilled roles in the UK due to low numbers of good quality candidates and that this could lead to firms increasingly seeking expertise and skills abroad.

Currently the UK is a very attractive destination for postgraduate students, second only to the US [QS Top Universities (2015)]. There are a variety of reasons for this, including the fact that half of the world's top eight universities are in the UK [QS World Rankings (2015)], and the UK is a world-leading research nation [International Comparative Performance of the UK Research Base, BIS (2011)] as evidenced by the 2014 Research Excellence Framework which reported that three-quarters of the research it evaluated was either 'world leading' or 'internationally excellent' [Research Excellence Framework (2014)]. It is essential that the UK remains attractive for postgraduate study as the EU and, indeed, International students currently make a vital contribution to UK scientific research, often taking up research vacancies where there are no UK students available. Already, EU graduate students are

expressing anxiety about undertaking postgraduate studies in the UK due to the uncertainty around fees, ease of ability to enter and remain in the UK, and future job opportunities, etc.

It is clear that the non-UK undergraduate and postgraduate students make a considerable financial contribution to higher education, particularly in the STEM subjects. To impose full overseas fees on EU students will undoubtedly have a major effect on the number and quality of EU undergraduate and postgraduate students the UK can attract. Going forward, the level of EU fees is a very important aspect of the BREXIT negotiations. A reduction in the number of EU students is also likely in the longer term to impact on the number International students, who will see the UK as a less attractive place to undertake their studies as it loses its position as a world-leading research nation.

In summary the present BREXIT situation presents a real and serious risk to the viability of universities, student numbers and hence income.

Access to EU Funds

EU funding (reported as 14.2% of all UK university research income in the year 2014-15 [Economic Impact on the UK of EU Research Funding to UK Universities, Universities UK (2016)]) has played an essential role in helping the UK build and maintain its status as a world-leading research nation, helping to counterbalance the declining national science budget. In fact, the UK does disproportionately well in securing EU research funding, obtaining 15.5% of the funding allocated under the EU research and innovation programme FP7. The loss of potential EU research funding is of serious concern to UK universities and industry, and any new funding arrangements must ensure total research budgets available to UK researchers are not reduced. This may mean more UK funding being identified if negotiations to maintain access to current funding streams are not successful.

Going forward, it is essential that UK researchers need to be able to access EU funding in a manner that will allow their leadership of EU-funded projects. If this is not feasible, then unless some other measures are urgently put in place to make up the short-fall resulting from the loss of EU funding, the UK will undoubtedly rapidly lose its place as a world-leading research nation and all the implications that come with that loss. Furthermore, it is important that BREXIT negotiations do not place insurmountable barriers to UK researchers accessing funding and research contracts from EU industry and charities. If the barriers are set too high, there is a substantial and real risk that certain areas of UK will be deprived of funding.

Industry, including the pharma and biotech industries, has also significantly benefited from the EU, either directly in funding by being a part of large research programmes or via improved collaboration with scientists both in the UK and Europe. One good example of this is the Innovative Medicines Initiative (IMI) which is Europe's largest public-private initiative aiming to speed up the development of better and safer medicines for patients. IMI supports large collaborative research projects and builds networks of industrial and academic experts in order to boost pharmaceutical innovation in Europe. IMI is a joint undertaking between the EU and the European pharmaceutical industry association EFPIA. The current IMI2 programme has 3.3 billion euros of research funding available for the period

2014-2024. It is essential that UK universities and industries can access this large pot of money in the future. It is worth noting that the UK public stand to lose out on the development of innovative new medicines if UK universities and industry are not part of large initiatives such as IMI. Similarly BREXIT is likely to also negatively influence the economic growth of the NHS, which currently benefits through existing investment in research by the life sciences industry.

In summary if negotiations result in any loss of income this will have to be compensated for through new UK funding streams.

Access to EU-funded Research Facilities

It is essential that BREXIT is carefully negotiated so that access to EU-funded small and medium scale research facilities is not lost. The loss of EU funding is likely to result in the loss of free at the point of use access to a large number of the small and medium scale research facilities, as it is unlikely that subscriptions and access charges will be paid for by the UK Government.

2. What the science and research priorities for the UK Government should be in negotiating a new relationship with the EU.

The priorities for science and research include ensuring that existing collaborations and projects meet their aims and objectives, as well as maintaining UK access to projects where EU governmental sources directly fund research projects, and facilitating access to small and medium-scale infrastructure and support networks. It is essential to ensure there are no barriers to collaborations with EU colleagues and further no barriers to UK scientists and researchers obtaining funding from EU industry, charities and other research/funding organisations. In addition it is necessary to maintain mobility of staff to enable the completion of existing projects as well as maintaining the flow of EU students at undergraduate and postgraduate levels via appropriate fee structures to fulfil both academic need and the wider UK deficiency in STEM skills.

3. What science and technology-related legislation, regulations and projects will need to be reviewed in the run up to the UK leaving the EU.

New EU Clinical Trials Regulations are set to come into force by the end of 2018. These regulations are meant to harmonise procedures for assessing clinical trials applications, as well as enhancing collaboration between ethics committees, streamlining safety-reporting procedures and increasing transparency surrounding the outcome of clinical trials. These regulations will create a centralised gateway for clinical trial applications. However, BREXIT means that UK patients will be left out of this new system, leaving EU patients ahead in accessing the latest innovative clinical research. The likely impact on the UK of not being involved in these new regulations is thought to be major and needs to be carefully assessed.

Furthermore, the impact of BREXIT on medicines licensing through loss of access of centralised processes, currently performed by the European Medicines Agency (EMA) needs to be fully understood.

Duplicate arrangements may need to be introduced leading to inefficiency and inconsistencies in access to medicines. It is likely to involve the pharma and biotech industries in much additional work and cost, increasing the cost of the drug development pipeline which might ultimately be passed onto the NHS and may result in new and innovative medicines not being licensed in the UK, thereby severely detrimentally affecting UK patients.

4. The status of researchers, scientists and students working and studying in the UK when the UK leaves the EU, and what protections should be put in place for them.

Current scientists and researchers, together with those EU nationals who come to work in the UK prior to departure from the EU, should have the right to remain for the duration of their existing contracts or courses under the same conditions as before. This must include scientists and researchers who have permanent positions with open-ended contracts. Similarly, current undergraduate and postgraduate students, together with those EU nationals who have come to the UK prior to any formal departure from the EU, should continue to be charged fees equivalent to UK students.

5. The opportunities that the UK's exit presents for research collaboration and market access with non-EU countries, and how these might compare with existing EU arrangements.

Over recent years the rapidly increasing cost and complexity of research has meant that collaboration with colleagues both within and outwith the EU has become more important. Although when working collaboratively, the location of a collaborator is not usually a consideration, careful thought always needs to be given to the practical aspects of the collaboration. Consideration needs to be given to aspects such as researcher mobility, the purchase, operation and maintenance of joint equipment, as well as the dissemination and exploitation of the research. Prior to BREXIT, careful thought needs to be given to such practical considerations to avoid unnecessary extra layers of complexity that put an extra burden on the researchers and thereby reducing value for money. To date, membership of the EU has facilitated opportunities rather than presented barriers and it is hard to see that BREXIT could provide better opportunities for collaboration.

6. What other measures the Government should undertake to keep UK science and research on a sound footing, with sufficient funding, after an EU exit?

It is essential that BREXIT is negotiated so that the UK pharma and biotech industries have access to European markets, and any lost research income is replaced.

Risks

The causes and consequences of risks associated with leaving the EU are described in detail in the text above.