

of these loans may never be repaid. The steep rise in tuition fees may also deter students from pursuing their education to graduate level and discourage international students (British physics students from a modest background can apply for a scholarship from the Ogden Trust, see Box 9.4). In July 2015, the Chancellor of the Exchequer (Minister of Finance) placed the university system under renewed pressure by proposing cuts to government subsidies for tuition fees paid by UK and other EU nationals.

Despite the attractiveness of the UK and its reputation for quality – it produces 15.1% of the world's most highly cited articles for a share of just 4.1% of the global research pool –,

its persistently low R&D intensity has been of concern to the country's scientific establishment (Royal Society *et al.*, 2015).

The country's openness to international flows of knowledge may also be at risk. The general election in May 2015 returned the Conservative government to power with a solid majority. In the run-up to the election, the prime minister had promised voters that the Conservatives would hold a referendum on whether or not the UK should remain a member of the EU by the end of 2017. This referendum will thus be held within the next two years and perhaps as soon as 2016. A British exit (Brexit) from the EU would have far-reaching repercussions for both British and European science (Box 9.5).

Box 9.5: What impact would a Brexit have on European research and innovation?

The cornerstones of the EU's single market are what are known as the four freedoms: the free movement of people, goods, services and capital. It is the free movement of people which has crystallized discontent in the UK. The government would like to restrict this freedom and is planning to consult the population on a possible exit from the EU by the end of 2017, if it does not obtain satisfaction from its European partners concerning its demand for a revision of relevant treaties.

The UK is one of the largest net contributors to the EU budget, so its departure from the EU would have far-reaching repercussions for both the UK and the EU. The negotiations over the various options for a post-withdrawal relationship would be complex. There exist several 'model relationships' for European countries situated outside the EU. The 'Norwegian model' or the 'Swiss model' are the options currently seen as being the most applicable to the UK. Were the UK's future relationship with the EU to be modelled on Norway, which is a member of the European Economic Area, the UK would continue to make a significant financial contribution to the EU – potentially even close to the level of its current net contribution of about € 4.5 billion. In this case, the UK would be subject to much of the body of EU law and policy, yet its future influence on the EU would be limited.

If, on the other hand, the UK opted for the Swiss model, it would not remain a member of the European Economic Area. The UK would have to pay less attention to EU legislation and make a smaller financial contribution but it would have to negotiate separate agreements in many different areas, including trade in goods and services, or the movement of people between the UK and the EU (see Chapter 11).

The impact of a Brexit on science and innovation in both the UK and in the EU would depend heavily on the post-withdrawal relationship between the UK and the EU. It is likely that the UK would wish to remain an associated member of the European Research Area, like Norway and Switzerland, in order to continue participating in the EU framework programmes. These are considered increasingly important in the UK for funding research, training PhDs and exchanging ideas and people. However, the co-operation agreement for each framework programme would have to be negotiated separately, especially if the UK were not a member of the European Economic Area. This could be a difficult negotiation, as Switzerland has discovered since the tightening of its own immigration laws in 2014, following a popular referendum, prompted the EU to grant Switzerland only limited rights to participation in Horizon 2020 (see Chapter 11).

The EU's structural funds would also be out of reach for the UK, were it to leave the EU. A withdrawal from the EU might also incite international firms to scale down their plans to invest in R&D in the UK. The country would no longer be a gateway to EU markets, nor would its probably stricter immigration laws be particularly supportive of such investment. Lastly, a Brexit would be likely to make the international movement of university researchers between the UK and the rest of Europe, or the world, more complicated and less appealing, owing to the greater anti-immigration sentiment in the country.

In its public discourse, the research community in the UK seems to be clearly against a Brexit. Within days of the May 2015 parliamentary elections, a campaign website entitled Scientists for the EU had been set up. A letter signed by prominent scientists was also published by the *Times* on 22 May 2015 and articles appeared in *The Guardian* newspaper on 12 May and in *Nature News* on 8 May 2015. According to an article published in the *Economist* on 29 April, whatever the British public decides, the referendum itself is likely to create 'political and economic turmoil' in Britain.

Were the Brexit to become a reality, whatever the post-withdrawal relationship, the UK would lose its driving seat for research and innovation within the EU, which would be a loss for both sides.

Source: Böttcher and Schmithausen (2014); The Economist (2015)