

Reforming incentives for research and knowledge exchange to strengthen university spinout performance: options and implications: Insights from an expert roundtable

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Tomas Ulrichsen and Len Kelleher

Attendees

Tomas Ulrichsen (chair)	Director, Policy Evidence Unit for University Commercialisation and Innovation, University of Cambridge
Professor Jonathan Grant	Director, Different Angles; formerly Professor of Public Policy, King's College London, Vice President & Vice Principal (Service), King's College London
Professor Richard Jones	Vice-President for Regional Innovation & Civic Engagement, University of Manchester; Professor of Materials Physics and Innovation Policy, University of Manchester
Tony Soteriou	Director of Commercialisation, UK Research and Innovation
Alice Frost	Director of Knowledge Exchange, Research England
Chris Gibson	Senior Policy Advisor, Research England
Alex Herbert-Guest	Associate Director of Research Funding, Research England
Carolyn Reeve	Head of Policy for University Research, Sustainability and Knowledge Exchange, Science, Research & Innovation Directorate, Department for Business, Energy & Industrial Strategy
Rachel Smith	Head of Business Innovation, Department for Business, Energy & Industrial Strategy
Victoria Smith	Lead Policy Analyst - UK R&I Institutions and System, Department for Business, Energy & Industrial Strategy
Tom McGee	Senior Policy Advisor – Innovation Strategy Team, Department for Business, Energy & Industrial Strategy
David Sweeney	Executive Chair – Research England
Phillip Cooper	Senior Policy Advisor – Innovation Strategy Team, Department for Business, Energy & Industrial Strategy
Duncan Shermer	Head of Research Assessment Policy – Research England
Len Kelleher	Research Associate, Policy Evidence Unit for University Commercialisation and Innovation, University of Cambridge

Disclaimer: This note was authored by Tomas Ulrichsen and Len Kelleher at the Policy Evidence Unit for University Commercialisation and Innovation (UCI). We have attempted to capture the key messages and insights from the roundtable as accurately as possible. We take full responsibility for any errors in doing so.

Motivation and aims of the discussion

This expert roundtable for policy examined and discussed potential options for strengthening the incentives for universities and academics to produce more spinouts with the potential to create value for the economy and society.

Strengthening the ability of universities to commercialise research is a key priority for the UK Government as it seeks to raise the R&D intensity of the UK economy to 2.4% of GDP and develop a more science and technology-driven economy. A key focus of policymakers currently is on strengthening university spinouts as a route to commercialising research.

Various options are being considered by policy officials within the Department for Business, Energy and Industrial Strategy (BEIS) aimed at strengthening the incentives facing universities and academics to encourage them to produce more spinouts with the potential for high economic and societal impacts (hereafter termed 'high value spinouts'). Of particular interest are the opportunities and consequences for reforming or expanding existing incentives and funding systems such as the Research Excellence Framework (REF), the Knowledge Exchange Framework (KEF), the Quality-Related block grant for research, and the Higher Education Innovation Fund (HEIF).

To support the development of policy options BEIS asked the Policy Evidence Unit for University Commercialisation and Innovation at the University of Cambridge to convene a small group of experts to discuss opportunities for new or revised incentives and, crucially, the consequences of pursuing different courses of action.

The discussion was based around the following questions:

1. As a means of delivering more 'high value' spinouts from university research, what would the main consequences be of reforming or expanding existing research and knowledge exchange incentives/funding systems (e.g. REF/QR/KEF/HEIF) to include a major component focused on 'high value' spinout generation?
2. What other options are available to the UK Government to strengthen the ability of universities and academics to produce more high value university spinouts?

Key concerns

Academic time and the high ‘opportunity cost’ of engaging in spinouts: Spinning out a company to commercialise research is a relatively high-risk endeavour as many spinouts will fail (as is typical with most high-tech start-ups). A key concern raised was the demands on an academic’s time to devote sufficient effort to getting their ideas to the point at which it has a commercial value proposition, spinning out the company, and then supporting its early development. Coupled with their core research and teaching priorities, that scholarly publications remain a powerful incentive for many academics, and that many spinouts will fail, there is a high opportunity cost associated with commercialising their research through a spinout; i.e. there is a perception that the time invested in a spinout that may well fail could be more productively invested in their research, teaching and other forms of KE activities. This raises a challenge for university / academic leadership and management in how best to focus their scarce resources to invest in those academics that have the greatest potential to succeed.

Minor impact on the 2.4% target: Currently, there is approx. £30 billion private sector expenditure on R&D (BERD), of which approx. £2 billion happens in start-ups. Even a doubling of start-ups would not significantly increase BERD. Consequently, a focus on start-ups should not be regarded as the main way to get to the 2.4% target of R&D spending (sources 2020 BERD data, British Venture Capital Association).

Unintended consequences for KE with large firms: For universities, there is significantly greater amounts of contract & collaborative research activity, particularly with large firms, than there is spinout activity. A recent 2021 survey of UK-based companies has shown that for around a quarter of companies (22% of large companies), their R&D-related KE interactions with universities led to an increase internal spend on R&D – i.e. they help to crowd-in R&D spending (Hughes et al., 2022, pp. 81-82). Therefore, any additional incentives for IP-based spinouts must ensure that they do not act to disincentivise R&D-related KE activity as this would impede achieving the 2.4% R&D-to-GDP target.

Unintended consequences for foreign direct investment: Related to the above point, UK universities often work with large foreign multinationals and other large companies based overseas. This attracts R&D-related FDI into the UK. Therefore, additional incentivisation of IP-based spinouts must consider what effect it may have on the ability of universities to deliver R&D-related KE activities with large companies, and hence on R&D-related FDI. Note, however, that there is some evidence to suggest that spinout companies, as they start scaling-up, begin to attract overseas investment, which equally contributes to inward investment to the UK.

Unintended consequences for non-IP-based KE: Emerging research by Jonathan Grant on the Hong Kong's Research Assessment Exercise suggests that while a higher proportion of their impact case studies have spinouts as an impact channel than those from the 2014 UK REF, most of these spinouts have not generated much if any value. However, among the two that did, one grew to become a company valued at over \$1 billion. This was not a spinout based on IP that could be protected and licensed by the university, but emerged from the idea, understanding and know-how generated by a PhD student while studying at the university. This again raises questions around whether creating stronger incentives for universities to commercialise IP from research through spinouts may result in technologies being overly 'forced' through this route when other KE mechanisms would be more effective, e.g. where working with a large company which already has in place the necessary breadth of resource, talent, facilities, alliances etc. to successfully commercialise the technology.

Unintended skewing of commercialisation effort towards specific sectors: Venture capital (VC) funds are most suited to commercialising certain types of technologies software/digital (including AI/data science), information & communications technologies and life sciences-related technologies, but are structurally unfit to invest in others, notably 'deep technologies' and clean technologies where there are high technological uncertainties and risks and long development times to economically productive applications (Gaddy et al., 2017; Portincaso et al., 2021). Consequently, additional incentives to boost venture capital for IP-based spinouts may end up prioritising the digital/ICT and pharma/biotech sectors while disfavouring other sectors of high strategic importance to the UK, notably clean energy technologies and other deep-tech which have the potential to deliver transformative economic gains in the longer term.

Geographical concentration of VC funding: VC funding is highly concentrated in London. Consequently, any incentives that are based on the scale of this type of finance (e.g. as attracted by spinouts) will disproportionately favour the Golden Triangle and further concentrate resources in this area of the country. This would act counter to the Government's Levelling Up agenda.

Favourable international comparisons: We must not underplay the performance of the UK in commercialising its research. Evidence suggests that the UK already compares reasonably well internationally in research commercialisation.

Focus on outcomes versus process: For the past 10-15 years, research and knowledge exchange incentives have been outcomes-driven and letting the system decide on the best way to achieve the desired outcomes. An active focus on IP-based spinouts within incentive systems such as the REF and KEF would depart from this in that it would be incentivising a particular type of KE mechanism. This may result in choices being made to attempt to commercialise certain types of technologies and IP

through a spinout channel, when other forms of KE would be better suited to its further development (e.g. working in partnership with existing companies).

Terminology: It is important to define clearly what we mean by research commercialisation and be careful not to equate the term with spinouts. This is done not just in policy debates but also in the academic literature. Spinouts are but one of potentially many *mechanisms* for translating and commercialising the IP emerging from university research.

Focus on long term success: A question was raised about whether it is possible to focus on measuring the long-term success of spinouts and using this to incentivise universities. A key challenge here is the high failure rate of spinouts, the inherent uncertainty of innovation in general, and the length of time it takes for many 'deep technologies' to move from lab to market. Metrics could more usefully focus on 'progression' towards impact, capturing whether spinouts have developed plausible and investable value propositions that are attracting decent first rounds of funding.

Possible incentives

Enabling culture change at universities: There is still room for further culture change within universities at all levels, including both the institutional senior management and the wider academic community to further legitimise spinouts as route to successful research commercialisation. Incentives are therefore very important.

Building and sharing technology transfer support capabilities: Spreading good practice in technology transfer and encouraging collaboration so that smaller institutions can benefit from the scale, breadth, and experience of technology transfer support typically available in the large research-intensive institutions, would be beneficial. This already happens in pockets (e.g. University of Manchester supports University of Salford) but could be further encouraged and enabled. As always, building these collaborations can take resource which needs to be sourced from somewhere.

Choice of funding mechanisms: The use of mainstream QR to incentivise spinouts was queried on grounds that it is a very indirect way to incentivise behavioural change within a university for a specific type of activity (e.g. spinouts). It was suggested that there was a sufficiently strong connection between the provision of QR to a university and what happens at a department and academic level to enable this to provide a valuable tool for creating additional incentives for spinouts.

However, it was also noted that in recent years more targeted forms of QR have been introduced to tackle specific challenges, such as business QR, enhancing research culture and participatory

research, and support policy development, with some perceived success. Such avenues, rather than mainstream QR could prove more useful in creating an institution-level incentive for universities.

Flexible funding mechanisms, such as HEIF and IAA, can be powerful tools for shaping how universities manage themselves and for enabling new KE structures and activities (including those that can support the development of spinouts). However, they are less good at directly incentivising academics to do specific things. One challenge with these funding mechanisms can be that universities regress back to traditional forms of internal peer review for allocating funding rather than being more strategic in how they invest the funds.

There was also a claim that the UK Research Partnerships Investment Fund (RPIF) has also led to significant spinout generation. RPIF was noted as a programme which, while a national programme, has successfully decentralised decision making from central government to universities working in close collaboration to determine what types of research infrastructure to build to deliver next generation research and innovation.

Spinout fellowships: To directly incentivise academics to invest effort in developing spinouts, the experts noted that you have to give them time. One relatively easy way to do this would be to create a form of fellowship dedicated to forming and nurturing a spinout. This was thought of as being have the fewest unintended consequences on other forms of KE and commercialisation efforts. In order to mitigate the fears of some academics that spinout activities would lead to lost momentum in their research careers, the spinout fellowship could be designed to enable them to spend a proportion of their time keeping their research going.

Spinout fellowship infrastructure: In developing any form of spinout fellowships, it is important to think careful about the type of infrastructure and support that needs to be in place (for example to support entrepreneurial capacity and capability building of the academic, facilitate networking e.g. with investors, potential collaborators for commercialisation etc.) to maximise its effectiveness. Examples discussed included the Royal Society's Junior Fellows scheme or Royal Academy of Engineering Industrial Placement Fellowships.

Enabling mobility: As ever, mechanisms to encourage mobility of entrepreneurs into universities, and academics into industry, would be useful. There is at least a perception that the UK system is more rigid than others in terms of academics moving in and out of industry and policy.

Enabling student start-ups: More effort to enable student start-ups should be prioritised. An interesting example from Canada's University of Waterloo was cited, where they have created a wide-ranging and integrated entrepreneurship support system to drive student entrepreneurship.

Double weighting spinouts in REF: Double weighting spinout impact case studies in the REF was discussed as a potentially useful intervention, though noting that there is currently no methodology for doing this. Some funding programmes already double-weight specific types of activity e.g. SME income is double weighted in the HEIF formula to recognise that this is a particularly challenging and hard-to-resource type of KE activity that requires additional incentives for universities. Interesting, it was argued that for some universities much of their research-focused KE income from SMEs actually comes from their spinouts returning to work with them due to the lack of R&D-active SMEs in their local economies.

There may be some issues with double weighting spinout cases studies in the REF that need to be considered further. First is that the impact side of the REF was set up to assess the impact associated with research undertaken at universities; i.e. it seeks to measure the ‘ends’ not the ‘means’ by which the outcomes were realised. The means – the pathways from idea to impact – are secondary. By focusing specifically on spinout-related impact cases, we would be introducing an incentive for a particular pathway. Given the very long timelines to impact for technologies being commercialised through spinouts (in some cases longer than the REF cycle), this could lead to an over-production of spinouts in the short term as universities respond to this incentive and channel commercialisation opportunities through spinouts where other forms of KE would be more appropriate (e.g. working in partnership with a large company).

Linked to this is that spinouts are typically commercialising very early stage, novel and breakthrough technologies which can take many years – even decades – to develop commercially valuable propositions. Many other things – often well beyond a university’s control – also typically have to happen for the spinout to be commercially successful. Tracking and attributing these impacts can become increasingly difficult as the company moves further away in time from its birth from the university. That said, there may be ways of overcoming this for example by looking at proxy measures for success that capturing whether a company is on a *trajectory* to long-term success.

Another issue that would have to be carefully thought through is that many spinouts will fail, due to the inherent technical and market risks associated with commercialising novel and emerging technologies, rather than ineffective commercialisation efforts of the university and/or academic. In creating incentives in the REF, it would be important to account for the portfolio nature of spinout successes. Lastly, the experts suggests that further consideration be given to the potential unintended consequences of such this type of approach.

Using REF to incentivise the development of the supporting institutional infrastructure for technology transfer: An alternative to double-weighting the spinout case studies which could distort

outcomes by incentivising the over-production of spinouts when other KE channels would be more appropriate, could be to focus on measuring the strength of the technology transfer environment, incentives, processes, and support infrastructure at universities through the REF environment statements.

A few notes of caution on this approach. The first is that in developing the REF there has been an attempt to create a strong link – at the Unit of Assessment (UoA) level – between the inputs (the research undertaken), the outcomes / impacts, and the environment that is put in place to enable the journey from input to impact. Reforming this section of the REF to include a greater focus on the tech transfer environment would need to consider how it can link explicitly back to inputs and forward to impacts. A second challenge is that in many universities the infrastructure to support spinouts and the incentives to encourage academics to engage, are developed at the university-level rather than the UoA level. Finally, there is a burden on universities in generating the significant information that underpins the REF exercise. Adding further requirements (e.g. to describe and evidence the TT environment) will create additional burden which needs to be set against the potential benefits in terms of increased incentives for spinning out companies.

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