

HEPI conference 2012

Wednesday 5th December 2012, The Royal Society, London

NF speech (25 minutes): UK university research as a driver of economic growth?

Outline

0. Good morning. It's a pleasure to be here once again at The Royal Society and for Elsevier to be hosting the HEPI Autumn conference, which as in prior years, is focused on the research mission of universities. This year we are exploring the linkages between research and the broader economy, and in particular the opportunities for universities to drive innovation and growth.
 - First, I will demonstrate the ways in which universities drive economic growth.
 - Second, I will show how governments are viewing universities and research as engines of economic growth, and implementing policies accordingly.
 - Third, I will reflect on the implications of this: just because universities and research can drive economic growth, should they be managed primarily to do so, and if so, where will it take us?
 - Finally, given these developments, how are we as an information provider seeing universities adapt?
1. On the first point, it is clear that universities do drive economic growth. Universities in the UK generate £59 billion for the UK economy putting the sector ahead of UK agricultural, advertising, and pharmaceutical industries¹. How do they do this?
 - First, universities **employ** around 382,000 members of academic and non-academic staff².
 - Second, they **develop future employees** by educating around 1.9MM undergraduates and 600,000 post-graduates per year. HESA found in 2012 that 69% of first degree graduates were employed in full-time paid work six months after graduation, of which 45% had entered managerial, professional or associate professional and technical occupations^{3 4}.
 - Third, UK universities are **significant institutional consumers**, spending around £27 billion annually on goods and services⁵.
 - Fourth, **UK universities provide services to businesses**, amounting to £3.3 billion of income in 2010-11⁶. They include the commercialization of new knowledge, and the delivery of professional training, consultancy and services. For example, vs prior year in the UK:
 - Spending on university services by large business increased by 7% to £629 million.
 - Universities' income from facilities and equipment – such as wind tunnels or digital media suites – increased by 12% to £129 million.
 - Income from Collaborative research with industry increased by 16% and contract research by 7%
 - 268 new businesses were set up based on the world-class research carried out by UK universities, bringing the total number of active spin-off companies to 1,262. These companies employed around 18,000 people and turned over nearly £2.1 billion during the year.
2. Because universities and research generate economic growth, governments are increasingly putting them at the heart of their economic recovery and growth strategies. I'll demonstrate this by looking more closely at research policies in the UK and the EU.
3. In their introduction to BIS' *Innovation and Research Strategy for Growth*⁷ Vince Cable and David Willetts acknowledge the UK's global reputation for Innovation and Research. Their strategy is to "build on the UK's

¹ University of Strathclyde report for UUK "The impact of universities on the UK economy":

<http://www.universitiesuk.ac.uk/Publications/Documents/EconomicImpact4Full.pdf>

² 181,000 academic, 200,000 non-academic – HESA, latest data – 2010/2011

³ http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2541&Itemid=161

⁴ <http://www.universitiesuk.ac.uk/Publications/Documents/UniversitiesUkSubmissionToThe2010SpendingReview20101004.pdf> p19

⁵ <http://www.hesa.ac.uk/index.php>

⁶ <http://www.hefce.ac.uk/news/newsarchive/2012/name.73740.en.html>

⁷ <http://www.bis.gov.uk/assets/biscore/innovation/docs/i/11-1387-innovation-and-research-strategy-for-growth.pdf>

recognised strengths... and to work with business and the knowledge base to underpin private sector growth...” .Overall they say: “We intend to maximise the impact of our research base on economic growth...”

Their plan outlines a wide range of policies and instruments designed to support these objectives. Their plan:

- Maintains the £4.6 billion budget for science and research programmes
- Committed – at the time of launch a year ago - £495MM since January 2011 to capital projects that support collaboration among universities and with external organisations.
- Continues support for the Technology Strategy Board to foster innovation. *By the way, I used to think “innovation” meant creating new things. I’ve since learned that in policy parlance it means commercialising newly created things.*
- Announces “Catapult” technology and innovation centers to commercialise innovation and research.
- Encourages the growth of innovation clusters through the “Launchpad” initiative.
- Announces R&D Tax Credits for SMEs and an extra £75MM for “Smart” grants that support SME R&D
- Increases support for “design-driven innovation” and collaborations with “hot spots and high growth economies” such as China and India
- Overall, aims to “get rid of red tape, make public sector data more accessible, and to fund “inducement prizes in areas where innovation is needed.”

Universities are “knowledge base providers” whose intellectual output can be commercialised to drive broader economic growth. Terms like “KnowledgeBase”, “Launchpad”, “Catapults”, “Clusters” and “Gateway to Research” sound somewhat Space Age. However, the prevailing rhetoric is Economic with references to “the market”, “universities and the wider knowledge base as a national asset”, “innovation”, “invest”, “budget”, “economic growth”, “assets” “returns”, “resources”, “productive”, “Capital Projects”, “commercialise”, “competitive”, “pipeline”, “funding”, “incentives”, “tax credits”, “voucher programme”, “high growth economies”, and “private sector-led growth”.

4. The thrust of the UK Government’s policy for research is further crystallised in the UK’s so-called “Industrial Strategy”. This has been described by Vince Cable at Imperial College London in September⁸, and by George Osborne⁹ and David Willetts¹⁰, each from this podium at the Royal Society within the space of a week last month.

In the words of George Osborne, the Industrial Strategy is “...all about creative interactions between science and business. You get innovation when great universities, leading-edge science, world-class companies and entrepreneurial start-ups come together. Where they cluster together, you get some of the most exciting places on the planet. That is where you find the creative ferment which drives a modern economy.”

5. You can see here the eight areas of UK research that are being prioritised. Each has substantial amounts of money allocated to them from government to encourage further investment by universities and industries. They are:
 - i. Big data and energy efficient computing
 - ii. Synthetic Biology
 - iii. Regenerative Medicine
 - iv. Agri-Science
 - v. Energy Storage
 - vi. Advanced materials
 - vii. Robotics and autonomous systems
 - viii. Satellites, commercial applications of space¹¹.
6. Similarly, the European Commission’s Horizon 2020 Framework Program for Research and Innovation was also couched in Economic terms when it was launched last year:

“The key challenge is to stabilise the financial and economic system in the short term while also taking measures to create the economic opportunities of tomorrow...”

⁸ <http://bis.gov.uk/news/speeches/vince-cable-industrial-strategy-september-2012>

⁹ http://www.hm-treasury.gov.uk/speech_chx_091112.htm

¹⁰ http://www.foundation.org.uk/events/pdf/20121114_Summary.pdf

¹¹ http://www.hm-treasury.gov.uk/speech_chx_091112.htm

“Smart investment, notably in research and innovation, is vital in order to maintain high standards of living while dealing with pressing societal challenges such as climate change, an ageing population, or the move towards a more resource-efficient society.

“Research and innovation help deliver jobs, prosperity, quality of life and global public goods. They generate the scientific and technological breakthroughs needed to tackle the urgent challenges society faces. Investment in this area also leads to businesses opportunities by creating innovative products and services...

“Research and innovation have therefore been placed at the centre of the Europe 2020 strategy to promote smart, sustainable and inclusive growth.”¹²

7. Once again the language of Economics prevails and there are a range of initiatives under three “pillars” of (1) Excellent Science, (2) industrial Leadership, and (3) Societal Challenges. These include The Innovation Union flagship initiative; the European Research Council; support for Future and Emerging Technologies; Marie Curie actions; Research infrastructures and E-infrastructures.

The EC also seeks to bring industry and research industries together, for example, “to build leadership in enabling and industrial technologies” “...promoting activities where businesses set the agenda”; “...ensuring “access to risk finance” and “support for innovation in SMEs”

The EC also emphasizes specific research topics and their commercial application. It talks of “Activities [to address Grand Challenges] from research to market with a new focus on innovation-related activities, such as piloting, demonstration, test-beds, and support for public procurement and market uptake”

Overall, the EC states that it “prioritises spending with immediate impact on growth and jobs”.

8. As with the UK, the EC’s emphasis on research as an economic growth driver is clear, and it seeks to achieve it by facilitating connections between research and industry. However, while the EC’s Horizon 2020 Framework implies a role for universities, their role is not explicitly stated. Curiously, a word count of the EC’s communication finds that “research” and “researchers” are mentioned 76 times, “industry”, “industries”, “enterprise(s)” and “SMEs” together 37 times, “finance” and “financial” 15 times, “economy” and “economic” 12 times, but “university” and “universities” are not mentioned once.
9. While the role of universities in UK government strategy is explicit, in the EC’s strategy it is implicit. But in both cases universities are seen as potential hubs at the heart of geographic clusters that can drive virtuous circles of economic growth by attracting talent, generating ideas, and harnessing industrial investment. Similar trends are now being seen in the US. Just last week The President’s Advisory Council on Science and Technology called for “Strategic investments in universities and national laboratories as hubs of innovation and economic growth”.
10. It is encouraging that universities and research are central to government policy. But the role envisioned for universities is a far cry from *Brideshead Revisited*, which is not necessarily a bad thing. However, it does raise some fundamental questions that we may want to reflect on: What are universities for in the first place? Just because universities can and do deliver economic growth, should they be managed for this purpose? How will universities adapt to this environment, and what will the consequences be?
11. The first question – what are universities for - has been well explored by Stefan Collini, a Professor of Intellectual History and English Literature at Cambridge University. On what defines universities, he says: “At an absolute minimum, the modern university might be said to possess at least the following four characteristics:
 - ...it provides some form of post-secondary-school education, where ‘education’ signals something more than professional training
 - ... it furthers some form of advanced scholarship or research whose character is not wholly dictated by the need to solve immediate practical problems

¹² Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *Horizon 2020 - The Framework Programme for Research and Innovation*, November 2011, p2

- ...these activities are pursued in more than just one single discipline or very tightly defined cluster of disciplines
- ... it enjoys some form of institutional autonomy as far as its intellectual activities are concerned¹³

Nowhere on this list of defining characteristics is the notion that universities are defined by their capacity to drive economic growth. Rather, their core activities – the pursuit of education and research autonomously across disciplines – would appear to deliver economic benefits almost incidentally. Said differently, universities may drive economic growth, but they were not made to drive economic growth.

12. But just because universities can and do deliver economic growth, should they be managed for this purpose?

It is not my position to say how universities should or should not be run. However, I do think that it is important to reflect on the fact that universities were not set up to drive economic growth. While they already do drive growth by pursuing their core missions to educate and advance research across disciplines with some form of institutional autonomy, developing or even optimising them to drive economic growth could compromise their ability to deliver on their core missions. So my personal perspective would be that universities should be viewed as engines of growth only to the extent that does not prevent them from delivering on their core missions. Failing that, we should be clear on who will deliver such core missions to society in the future if not universities, that is given that we still believe in the need to have autonomous education and research.

Others might say that my question is irrelevant. With the exception of a small independently wealthy minority, universities would seem to have little choice but to position themselves as potential engines of economic growth if they are to survive and thrive.

As recipients of taxpayer funds they are increasingly under pressure to align themselves with the priorities of taxpayers and of the governments that represent them. They are also under pressure to align themselves with the interests of other potential funding sources, notably that of industry.

Government see universities as engines to deliver taxpayers with jobs, ideas that can be commercialised, investment capital, and innovation to improve the quality of life. Industry sees universities as vehicles to leverage for their skilled staff, services, and equipment more efficiently than they can deliver themselves. The result are so-called “triple helix” initiatives that enmesh and intertwine universities, government, and industry.

13. On my final rhetorical question - how will universities adapt and what will the consequences be – there is not enough time here to explore the profound ways in which the forces that I have spoken about are changing the face of universities. Suffice it to say, the implications are enormous, and perhaps like this picture of Mystic Meg, a little scary.

The forces that I have described affect the funding of universities, who goes to them, for what purpose, in short everything about them: their inputs, throughputs and outputs. For example, in 2009 more students in the UK studied business studies and accounting alone than went to all universities to read all subjects in 1980¹⁴.

Given the limited time remaining, I will confine my observations to what Elsevier sees as an information-provider to the sector. For changes in the demand for and use of research information are themselves indicative of broader changes going on within universities.

In short, we are seeing a significant increase in the demand for management information, reflecting the a growing managerial culture within universities as they position themselves to align more systematically with government and industrial sectors. I will close with four examples that illustrate this trend.

14. First, we are seeing a significant increase in the adoption of so-called Current Research Information Systems. These provide research-intensive institutions with up-to-date, enterprise-wide information about their research activities.
15. For example, Pure - a Current Research Information Systems that is now owned by Elsevier – did not exist in the UK in 2008, but is now in around 20 UK universities, a dramatic increase that is no doubt also fuelled as UK universities prepare for the REF.

¹³ Stefan Collini, “*What are Universities For?*” Penguin Books, 2012, p7.

¹⁴ Derived from data cited by Stefan Collini, “*What are Universities For?*” Penguin Books, 2012, p32.

16. Of those 20 UK universities that account for the most research council grant income awarded, the combined grant income for universities with Pure increased by 12% vs prior year, while for those that did not have Pure their combined grant income fell by 11% vs prior year. This effect is likely due to the enhanced visibility that Current Research Information Systems provide into researchers' activities and capabilities, enabling better alignment with shifting foci of funding sources. Overall, this trend shows how UK universities are managing research more systematically.

17. Second, and related to this, we are seeing a significant increase in demand for comparative data and metrics.

A good example is the recently launched Snowball Metrics in the UK. Snowball Metrics are a new freely available open standard that aim to enable any university to calibrate its research inputs, throughputs and outputs. They also aim to enable universities to compare themselves in a like-for-like manner.

Almost 100 people signed up to attend a Snowball Metrics informational webinar last week, and fifty are signed up to attend workshops in-person next week in London, Swindon and Manchester.

The widespread support for Snowball Metrics by research managers and senior leaders of the sector alike indicates the high value that universities now place on having a standard vocabulary to articulate where they stand today, to set goals, and to monitor their progress towards them over time.

18. Third, we are seeing increasing demand for information tools that identify institutions' strengths so that they can align them with government priorities. For example, here's a screenshot of SciVal Spotlight which EPSRC adopted last week. It uses an advanced bibliometric algorithm to identify areas of distinctive strength for institutions and nations.

Here you can see one of the UK's 400+ research strengths that pertains to one of the eight areas mentioned in the UK Government's Industrial Strategy: Satellites and Commercial Applications of Space. The chart shows an areas of strength in Ionospherics, the study of a part of the upper atmosphere. The UK is second only to the US in this cluster of research, and its leading researchers are not at the usual suspects, but at the Universities of Leicester, Lancashire and Bath, positioning these institutions well for the £240 million of funding earmarked to promote this subfield of research.

19. A fourth trend is the Showcasing of gathered information. Universities and funding bodies are investing to broadcast information about themselves and their strengths to prospective collaborators, governments and industries as they seek to attract talent, funding and investment.

This is illustrated by the increase in the number of UK universities that have recently commissioned economic impact studies. UUK, Russell Group and 1994 Group, plus ten out of 24 Russell Group members have all commissioned and published Economic Impact studies in the last few years.

UK Research Councils have developed and launched Showcases – such as Research Outcomes System (ROS), Research Outputs Database (ROD), ResearchFish (formerly E-Val) depending on the Research Council concerned. These require grant recipients to input data about their research and collate information that can be used in reports and case studies to demonstrate the value of funded research.¹⁵

The UK Government itself is investing in Showcasing via "Gateway to Research", which aims to allow ready access to Research Council funded research information and related data via the web.

20. In the US, local governments are sponsoring publicly accessible regional portals to showcase researchers, projects, and equipment for local businesses. More than simple websites, these portals apply sophisticated semantic search technologies that text-mine thousands or millions of documents to create tailored "fingerprints" that increase the accuracy and efficiency of searches.

¹⁵ The ROS is based on the existing ESRC collection system which has been developed on behalf of the AHRC, BBSRC, ESRC and EPSRC. The remaining three Research Councils will continue to use alternative existing systems. MRC and STFC are using the e-Val system and at present, NERC is continuing to use its Research Outputs Database (ROD). See: <http://www.rcuk.ac.uk/media/news/2011news/Pages/111124.aspx>

An example is shown here from North Carolina's Research Triangle Park, a highly successful university-industry partnerships between 170 R&D-intensive global companies located between three major research universities: Duke (Durham), NC State (Raleigh), and UNC (Chapel Hill). The region has the highest concentration of PhDs in the US outside Cambridge, Massachusetts. To stimulate further collaboration with industry, Elsevier's SciVal Experts has built a network with the State of North Carolina called "Reach NC" that connects all 16 state universities and Duke to profile 13,000 researchers.

One of the companies in the Research Triangle Park was looking for a US academic partner for a \$10MM, 5-year joint research project in a variety of engineering disciplines. It used the ReachNC system to determine that the relevant engineering expertise was available at North Carolina State University in Raleigh, so facilitated an academic-industry partnership whose funds could have gone to an institution in another state.

Comparable portals are underway in Michigan, Illinois, Arizona, and Texas. Their goal is exactly aligned with UK and EU policy: to facilitate collaboration with universities' who have research expertise, and industry that has the capital and know-how to commercialise it, thereby driving economic growth.

21. In summary, whether universities *should* be managed as drivers of economic growth or not, the fact is what significant forces – perhaps most of all government policy - is spurring them to do. We'll hear much more about how this is the case, and what the implications are from our speakers today. If this is the direction in which universities want –or perhaps need - to travel, then our goal is to ensure that we provide you with the best information systems, data, metrics, and tools to get you there. We look forward to travelling with you as we move forward on this journey.

Thank you.