

Summary of Evidence Session “Science, Engineering and Innovation”¹

Ayman Asfari, Keith O’Nions, Jon Moulton, 30th of May 2012

The LSE Growth Commission’s evidence session on “Science, Engineering and Innovation” was held on Wednesday 30th May 2012. Jon Moulton (Chairman and Founder, Better Capital), Ayman Asfari (Former Chief Executive Officer, Petrofac) and Keith O’Nions (Rector, Imperial College London) shared their views on the key drivers of Science, Engineering and Innovation in UK and discussed them in an international context. The session was chaired by Professor Francesco Caselli, who was joined by commissioners Professor John Van Reenen and Professor Tim Besley. This note provides a summary of the main evidence and arguments made.

Jon Moulton opened the session with a general consideration on the negative relationship between public sector size and economic growth and a critical view on the effectiveness of the inflation target to sustain growth. His discussion was focused on two main aspects: the education system, that should be more focused on vocational subjects with fewer universities, especially in non-vocational areas; and the financial system that by spreading money too thin in the innovation and technology area doesn’t allow the achievement of a critical mass. Venture capitals should be key actors in providing financial support to innovation activities but in UK and Europe they are smaller and weaker than in the USA. In late 1990s many big European venture capitals have moved upstream to buyouts (Apax), disappeared (NetPartners, 3i), been acquired (Quester, Frontiers Capital), or seen their investment teams move on (Add Partners, Atlas Ventures).

Keith O’Nions motivated his presentation with an analysis of UK’s performance in science and innovation. He stated that while UK is one of the world’s highest performers in science as shown by different indicators (3.9% of researchers; 6.4% of articles; 10.9% of citations; 14% of top 1% highly-cited articles; 2.2% of patent applications), in terms of commercialization of its innovation UK lags behind world leaders (US, Japan) and European leaders (Germany, Sweden, Switzerland). While government support for science remains strong and competitive compared to other countries, business spending in R&D is significantly lower than the leading competitors and the OECD average. This largely reflects the structure of the UK economy where high-medium technology enterprises are small relative to competitors (i.e. R&D intensive sectors and larger service sectors). As a consequence, business financial support to university is small. Thus, the basic ingredients of the innovation cycle are broadly competitive in the UK but the country lacks competitiveness in ensuring an optimum use of them.

¹ **Disclaimer:** This summary document represents the views of the evidence givers and not necessarily those of the commissioners.

His second argument centred on the government's policies to support innovation. The key element of successful policies has been long-term support for research matched with sufficient concentration of resources that allows the UK to maintain its high-performing position. The Technology Strategy Board (TSB) and business collaborative funding are examples of good policies although far too little money is invested in comparison to the Fraunhofer Institute in Germany. Government policies have also been successful in supporting science, technology, engineering and mathematics (STEM) subjects in higher education and on spin outs by putting money in areas close to the market.

On the other hand, less successful policies include the 'picking winners' approach, the loss of diversity in universities following 1994 policy changes and the failure of successive governments to develop policies for a world-class national infrastructure that underpins an effective innovation system. He identified a critical area of government intervention: the attempt to bridge the gap between science and commercialization. Government can intervene to increase the skill level (also promoting on-line courses with a proper accreditation), which would lead to more innovative businesses by pushing the universities even harder towards commercialization. As an example he mentioned the "Higher Education Innovation Funding (HEIF)" which provides funding for knowledge exchange to support and develop a broad range of knowledge-based interactions between universities and colleges and the wider world and that has resulted in economic and social benefits for the UK. Moreover, he stressed on the importance of students' placement experiences in businesses to create a stronger link between science and commercialisation. Keith O'Nions concluded his presentation with a remark on the importance of university clusters: regional governments - instead of the central policies- are better in creating the condition for innovation.

Ayman Asfari, the CEO of Petrofac Limited, started his business in the UK in 1991 attracted by the UK's rule of law, its geographical position between US and MENA/Asian markets, the availability of excellent financial and professional services, a good education system, a strong and independent currency and high quality of life. According to him, all these key features are underplayed and the UK should encourage foreign entrepreneurs to build enterprises, not just inflate asset prices. To achieve these goals, Ayman Asfari suggested modifying the visa requirement for investors (making it similar to the Tier 1 Entrepreneur visa); or link the beneficial personal tax clauses for foreign high net worth individuals with a requirement to develop their businesses in the UK.

However, UK is not the perfect business Eden. Ayman Asfari highlighted the danger of UK falling behind other economies in its infrastructure development. Looking at air transport, he brought to point the situation at London Heathrow and City Airports that are at their capacity limits but at the same time are not well connected to the emerging economies. The railway transport is characterized by very high ticket prices: UK seasonal ticket costs for medium distances are 1.88 times higher than the next most expensive country (Passenger focus, 2009). Moreover in the UK there are 71km of High Speed Transit in operation, relative to 1185 km in France. The energy sector, also, requires huge investment in power generation and

grid capacity. The average UK broadband speed is ranked 25th, slower than Moldova, Romania and Netherlands.

Turning to the science and engineering sector, Ayman Asfari reminded us that it has been a critical part of UK's economic past. However proactive mechanisms are needed to develop the UK's technical base. He suggested investing more in promoting the reputation of the science and engineering sector in order to attract talent into these sectors; to create linkages between industry and education through scholarships, sponsorships and apprenticeships; to increase the focus on Mathematics and Science at school by enhancing the use of incentives (both for teachers and pupils); to use market mechanisms/financial incentives to encourage skills development in key areas for the UK economy (i.e. Engineering, Geology, Petrophysics etc.) through cheaper course fees, lower student loan rates or longer pay back periods.

Embracing a different approach than the previous speaker, Ayman Asfari said we should focus on few strategic sectors to develop differentiated capability: only if you are the best you can win. He suggested identifying and selecting 3-5 strategic sectors to drive, excite, build and expand UK engineering and scientific talent (for example Oil & Gas, Renewables, Aerospace, IT, Pharma/Biotech) and to use the UK's experience and mature market environment as a platform to develop top-end capabilities that can be exported globally. A potential tool to support these strategic sectors is the use of R&D grants to universities in key enabling technological areas; R&D tax breaks to companies investing in these areas; and the creation of innovation clusters with incentives to encourage start ups.

The questions from the commissioners led to a fruitful discussion about the importance of good operational models in which experience is more critical than the access to finance for the success of start ups. Following this approach, the panellists suggested that venture capitals should provide best practices support and business consultancy, not only financial support. Also management plays a critical role in the development of any core business model. Hence it's important to improve the quality of management resources by increasing business education and improving the quality and accessibility to MBAs. Ayman Asfari denounced the shortage of skills/talent in the manufacturing sector owing to the competition with the financial sector that offers higher wages and better working opportunities. During the Q&A session key topics on the speaker's presentations were widely discussed such as the urgency to fix the infrastructure problem, the failure of venture capitals in supporting universities spin offs, the importance of achieving a critical mass in investment while avoiding spreading the money too thin, the role of immigration policy in attracting foreign talents and the pro and cons of the 'picking winners' approach.