

This is taken from my 17/4/17 response to the UK government's Green Paper on Industrial Strategy. The full response is at <http://bit.ly/AlexIndStr>.

**1. Question 5: What should be the priority areas for science, research and innovation investment?**

- 1.1 “Science, research and innovation” conventionally refers to “natural” science, such as biology, chemistry and physics. Pillar 1 of the Green Paper indeed takes this conventional view. The Government is absolutely right to prioritise investment in natural sciences, and this can indeed lead to patents, innovation, and commercialisation, as stated on p27.
- 1.2 However, research, commercialisation, and innovation are far from limited to natural science. There are substantial opportunities and payoffs to investing in economics and business. The Nobel Prize in Economics is officially named the Nobel Memorial Prize in Economic Sciences, and the study of management is known as “management science”. This is far from a semantic issue. Just like in the natural sciences, economics and management sciences involve both:
  - 1.2.i *Empirical research* – forming hypotheses and testing them with large-scale data. A common misconception is that it is impossible to obtain causality in economics, since we cannot hold everything else constant (unlike in a lab). This is not true; indeed, p40 of the Green Paper refers to the excellent work of the Behavioural Insights Team which has used Randomised Controlled Trials (RCTs) to obtain the similar “treatment vs. placebo” testing used in natural science. Moreover, it is not even necessary to run RCTs to identify causality. “Natural experiments” are an established technique to do so in economics, similar to experiments in the natural sciences (hence the nomenclature) – but in large data.
  - 1.2.ii *Theoretical research*. In natural sciences, computers can model the spread of a disease. Similarly, economists can create models of an economy, and study the effect of policy changes (e.g. the effect of tax changes on new business formation). Just like a flight or city simulator, this allows us to study the effect of policies without the risk from actual implementation.
- 1.3 There is tremendous potential for innovation in economics and business to be a cornerstone of the UK's industrial strategy. A strategy to revitalise UK business cannot ignore research in business. Indeed, there are established fields that could address many of the questions in the Green Paper, such as:
  - 1.3.i *Entrepreneurial finance*. This studies issues such as the best ways to encourage new business formation and why small businesses succeed and fail. Common sense would tell us (without any need for research) that the entrepreneur's wealth, access to finance, business connections, and past education should all matter. But, *how much* does each matter? This question is of national importance, as it would guide the Government on where to focus its resources.
  - 1.3.ii *Corporate finance*. This studies the financing decisions of established corporations, e.g. the causes of underinvestment and the best way to stimulate investment.
  - 1.3.iii *International finance*. This studies issues such as how to improve the UK's exports and support inward investment.

- 1.3.iv *Energy economics, environmental economics, industrial economics, and public economics* are four other established fields that have relevance for many other questions in the Green Paper. Moreover, outside of economics, many fields of management research can have substantial benefits in boosting the UK's productivity. For example, they can identify the optimal ways to organise production, change corporate culture, form and manage diverse teams, negotiate, modernising accounting systems to account for intangibles, and devise marketing strategy.
- 1.4 p27 of the Green Paper refers to patents and commercialisation in the natural sciences. Patenting is not an issue with economics and business research. Very few ideas can be patented, and so the findings would be accessible to all UK businesses and households. While commercialisation is indeed a challenge in the natural sciences, it is almost immediate in economics – a new way to organise production, negotiate, or pay executives can be implemented almost immediately.
- 1.5 Indeed, the Green Paper on Corporate Governance and the BEIS Select Committee's Corporate Governance Report cite many research papers which have informed their proposals and suggestions. For example, the proposal to replace Long-Term Incentive Plans (bonuses based on financial targets) with long-horizon equity, in 1.61-1.66 of the Green Paper and 87-95 of the Corporate Governance Report, is partly informed by extensive academic research on the effects of executive compensation.
- 1.6 It is indeed true that research is *already* being done by many organisations, such as think tanks and management consultancies. Such research has great value. However, just as in natural sciences, there is substantial additional value to peer-reviewed academic research. While academics are often accused of being detached from the real world, this detachment is valuable as it gives several years to address a problem – to absolutely nail down a result, to address alternative explanations, to distinguish causation from correlation – while in the real world, you may only get months. Peer review involves a paper being rigorously scrutinised by the world's leading scholars. The most elite journals reject 95% of papers. Thus, if we were to base policy decisions on an unvetted paper, there is around a 95% chance that this paper would be misleading. Indeed, sometimes papers end up with the diametrically opposite conclusion after going through peer review and correcting their mistakes.
- 1.6.i In natural sciences, universities undertake “basic research”, the commercial value of which is only later realised. Similarly, in economics, practitioner research often focuses on problems currently faced by clients, but academic research can address questions that may become critical in the future. For example, much of the research on executive pay was undertaken before the current debate, which is critical since it can take five years for a result to be fully nailed down. As the saying goes, “dig the well before you're thirsty.”
- 1.6.ii I re-emphasise that practitioner research has substantial value. Academic research should not be the only focus of an industrial strategy, but it should be an important part of it.
- 1.7 UK universities compare favourably to their international competitors in natural sciences although, as the Green Paper rightly points out, there is substantial room for improvement. However, UK universities lag far behind the US in economics and business. For example:
- 1.7.i The Arizona State University's ranking of finance department by publications in top journals (a widely recognised ranking) contains only four UK institutions in the top 100.<sup>1</sup> The Russell Group of UK universities all have internationally renowned departments, but few have internationally renowned business schools. Oxford, Cambridge, and Imperial are frequently

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<sup>1</sup> Source: <http://apps.wpcarey.asu.edu/fin-rankings/rankings/results.cfm>, rankings based on publications from 1990 to 2015 (the default option). Note that this ranking is focused on research output, whereas business school rankings are driven by many other factors. For example, UK universities are helped by the fact that they typically have a 1-year, rather than 2-year MBA programme.

ranked in the world's top 10 universities, but Oxford is #58 in the above finance ranking, and neither Cambridge nor Imperial are in the top 100.

- 1.7.ii The American Finance Association and the American Economic Association are, respectively, the *world's* leading professional bodies for finance and economics.
  - 1.7.iii The vast majority of the world's best UK-born economists and business scholars are based in the US, including Oliver Hart and Angus Deaton, who won the Nobel Prize in 2016 and 2015, respectively. Indeed, the phrase “brain drain” was initially coined for academia.
- 1.8 The underperformance of UK universities is a particular problem in economics and business. With natural sciences, a discovery found by a non-UK university can be applied by UK businesses (absent patent issues). The behaviour of a given molecule is the same inside the UK as outside. However, in economics, the results depend critically on the context – such as laws, institutions, and cultural norms. Findings from US studies may not automatically apply to the UK. It is a major problem for the UK that the vast majority of top business research is conducted on US data. Karolyi (2016) finds that only 16% of all empirical studies published in the top four finance journals examine non-US markets.<sup>2</sup>
- 1.9 The UK lags seriously behind its international competitors in its funding for economics and business research. This includes funding by government bodies, foundations, and the universities themselves.
- 1.9.i In the US:
    - Universities have much greater endowments than the UK, since business schools are much older and there is more of a culture of alumni donations. Harvard Business School and Wharton have endowments of \$3bn and \$1.3bn respectively, compared to £50m at London Business School. As a result, “official” faculty research budgets are much higher in top US schools than the UK. Combining official budgets with “discretionary” funds and research centres, US budgets are often effectively unlimited. Simply put, in the US, faculty have hardly any financial constraints on doing the best quality research.
    - The National Science Foundation has a programme dedicated to Economics, i.e. recognises Economics as a science. The UK could significantly expand the funding of the Economic and Social Research Council.
    - The National Bureau of Economic Research is the premier organisation in the global economics profession. It runs programmes in many areas relevant to the Green Paper (e.g. Education, Household Finance, Industrial Organization, Innovation Policy, Market Design, Productivity/Innovation/Entrepreneurship); each programme involves the highest-quality conferences and a Working Paper series, where new research is disseminated to the public. It is extremely cost-effective, spending only \$25 million per year on research activities. Rather than supporting research by funding (e.g. the purchase of data), it does so by organising conferences where academics can present early drafts of a paper and receive feedback from leading scholars, substantially helping the paper.
    - The Kauffman Foundation is dedicated to research in entrepreneurship and education, two critical areas of research for the Green Paper.
  - 1.9.ii In Norway, Norges Bank Investment Management's (the sovereign wealth fund) Norwegian Finance Initiative funds research and education in financial economics, by attracting scholars

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<sup>2</sup> Karolyi, G. Andrew (2016): “Home Bias, An Academic Puzzle.” *Review of Finance* 20, 2049-2078.

of international recognition to Norway, financing PhD students, and funding research programs (including a partnership with the NBER in long-term asset management).

1.9.iii In Sweden, the Swedish Institute for Financial Research was a government initiative established in 2001 to strengthen financial research in Sweden and support the dialogue between researchers and practitioners. (In 2016 it merged into the Swedish House of Finance).

1.10 Research requires not just funding, but also data.

1.10.i Several Scandinavian countries maintain financial information on all households. Statistics Sweden, the government's statistical agency, collects household-level wealth data, including all financial assets such as bank accounts, mutual funds, and stocks. Euroclear Finland maintains records of every Finnish stockholder, including the date, trade, volume, and price of each transaction. Note that the data given to researchers does not contain any identifying information.

1.10.ii In the US, there are numerous well-maintained commercial datasets (thus removing the need for the government to provide such datasets):

- The Center for Research in Security Prices maintains records of stock market data.
- Compustat provides accounting information on global companies.
- Execucomp provides executive compensation information for S&P 1500 firms, including the breakdown between salary, bonus, shares, and options.
- I/B/E/S contains earnings announcements and analyst earnings forecasts.
- Thomson Reuters maintains a plethora of market data, including equities, commodities and energy, fixed income, foreign exchange, and money market data.

1.10.iii The UK has far fewer commercially available datasets than the US and none of the public datasets available in Scandinavia. The London Share Price Database contains UK stock returns. FAME provides far less accounting information than Compustat. I am not aware of a reliable UK database for executive compensation or earnings forecasts.

1.10.iv The Bank of England's One Bank Research Agenda is a useful step in this direction, giving researchers access to datasets. These are predominantly macroeconomic datasets; something similar for corporate finance or microeconomics would be valuable.

1.11 The Government should encourage the dissemination of economics and business research in a non-technical manner, to ensure that the fruits of such studies benefit everyone. For example, there are many informative television programmes on the natural sciences, with the likes of Brian Cox and Sir David Attenborough having made tremendous contributions in educating the public. There are far fewer programmes on economics and business *research* (as opposed to current events) – even though books like Freakonomics (Steven Levitt and Stephen Dubner) and Predictably Irrational (Dan Ariely) – both by US-based writers – show that the potential for popular appeal is very high. NHS Choices make the findings of medical research clearly available to the public. The Government could similarly make available the findings of the highest quality research on management techniques and economics, particularly helping small businesses.

1.12 One misperception is that “social” sciences do not include the rigorous hypothesis testing in the natural sciences. The “social” sciences contain a range of disciplines, from archaeology and history to economics and business, and so we cannot consider them all in the same bucket. Economics and business has much more developed methods of hypothesis testing, statistical robustness, and causal

identification, plus the availability of large scale data. The requirement to prove views with data ensures genuine scientific investigation (at least in the very top journals) rather than ideological position-taking.

1.12.i Note that this is not to argue that other subjects are not worth studying. Many subjects (e.g. English, music, archaeology, history) are very valuable, even if they do not involve large-scale testing. This point is only to clarify that, if “science” is a particular priority for the Government, economics and management science should be treated equally with natural sciences.

1.13 The above arguments are absolutely not to reduce the importance of investment in natural science. Instead, they are to highlight that investment in economics and business research should be just as much a cornerstone of the UK’s industrial strategy as natural science.