



MAKING THE UK A GLOBALLY COMPETITIVE INVESTMENT ENVIRONMENT

The Wright Review of advanced manufacturing in the UK and its supply chain

Mike Wright



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1

FOREWORD – THE OPPORTUNITY AND THE THREAT

- 1.1** It would be easy to conclude, given the current success of many UK based advanced manufacturing companies, that the sector's contribution to a sustainable recovery here is secure. It is not.
- 1.2** Much progress has been made, but the sector has reached a crucial point in its evolution. What we do now will make the difference between long-term success and marginalisation. So I am particularly grateful to Ed Balls and Chuka Umunna for inviting me to undertake this independent review. I hope it will be influential with all the political parties, within government and industry, and in public debate more widely.
- 1.3** If we build on our success, and respond with determination to the challenges I lay out in this report – on productivity, costs, innovation, skills, funding and the governance of industrial policy – then the sector will play a major role in growing and rebalancing the UK economy in the long run.
- 1.4** If we become complacent, and take our current progress for granted, we will miss a once in a generation opportunity to compete and succeed in one of the world's most competitive sectors. We must focus ruthlessly on creating a globally competitive investment environment here in the UK.
- 1.5** My whole working career has been spent in the UK based automotive sector, including under European, US, and now Indian company ownership. From my first export assignment in Germany in the 1980s, through subsequent roles involving over 50 other countries, I have witnessed the speed with which other economies around the world have transformed their manufacturing capabilities.
- 1.6** In most cases it has been because their successive governments have placed the sector at the forefront of national economic strategy. So it should be no surprise that my key challenge in this report is for politicians and policy makers to put at the heart of their thinking the global context in which the advanced manufacturing sector operates.
- 1.7** I have deliberately taken a business perspective, with challenging insights provided by my Expert Panel and by many other organisations and individuals. The recommendations are also challenging, not only for politicians and policy makers, but also for other stakeholders including the business community. I firmly believe that radical, determined, and most importantly sustained action is required to secure the prize: a vibrant, world-class advanced manufacturing sector that helps the whole UK economy thrive in the long term.
- 1.8** Finally, I'd like to record my immense gratitude to Richard Brooks in his role as my Secretariat throughout the development of this report.

Mike Wright, June 2014

TEN PRINCIPLES FOR SUCCESS

- 1 Advanced manufacturing is a sector of strategic national importance and is vital for a balanced and sustainable economy.
- 2 A thriving advanced manufacturing sector is critical to research and innovation in the UK, and for our balance of trade.
- 3 The UK is competing internationally as a location for investment and business growth, and advanced manufacturers large and small are competing internationally for their revenues.
- 4 The overall level of manufacturing in the UK is entirely the result of a series of specific investment decisions by companies: government needs to see things through this lens.
- 5 Investment decisions are based on a combination of factors including access to skills and other resources, the environment for innovation, proximity and access to markets, access to funding and resources, and the full range of costs faced by firms.
- 6 Government fundamentally affects all these factors and should act strategically, proactively, and in a coordinated way to improve the investment environment in the UK.
- 7 Policy statements, tone, language and signals from government matter as well as the reality for investment decisions.
- 8 Cross-party consensus on key issues, stability of policy and a clear long-term direction of travel are better than well-meaning tinkering that creates instability, complexity and uncertainty.
- 9 Policy changes should be infrequent and focused on making a major long-term difference to the issues that matter most for our global competitiveness.
- 10 Other countries are making massive efforts to improve their investment environment, we are already behind many of them, and it will require sustained effort to catch up.



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EXECUTIVE SUMMARY - CREATING A GLOBALLY COMPETITIVE INVESTMENT ENVIRONMENT

- 2.1** The most important argument of this Report is that **governments in the UK must focus sustained effort on creating a globally competitive investment environment for advanced manufacturing in the UK.** The long-term success of the sector depends on the determination with which we meet this challenge.
- 2.2** Despite its current success, there is no assured future for advanced manufacturing in the UK. **Whether the UK advanced manufacturing sector is still significant in twenty years' time depends entirely on the investment decisions taken by companies between now and then.** If companies – both domestic and foreign – choose to invest and re-invest in the UK, then jobs and growth will follow. If they stop investing or invest elsewhere instead, the sector will decline.
- 2.3** Manufacturing is not the same thing as assembly. It is a long chain of activity from ideas, research, design and development; through sourcing, production, logistics and assembly; to servicing, upgrading, and eventual recycling. **Advanced manufacturing is distinguished by its intensive use of knowledge and research, both in the advanced products that are created, and in the advanced processes creating them with ever increasing efficiency and sustainability.** The UK has world leading advanced manufacturing companies in sectors including aerospace, automotive, pharmaceutical and many others, and some world-beating specialist industries such as the extraordinary Formula 1 cluster.
- 2.4** We live in a world that is still industrialising, in which the UK can be a great manufacturing nation. Right now advanced manufacturing is a success story for the UK. It is growing and creating high-quality jobs. It is playing a crucial role in our exports, our regional economies, and in research and development. **If we want a balanced and sustainable recovery, we need the success of advanced manufacturing to continue.**
- 2.5** **Other countries are pouring massive political and economic resources into improving their competitiveness and their advanced manufacturing capability.** They are upgrading their infrastructure and transforming the skills of their workforce. They are prioritising science and its links with industry. They actively reach out to global companies to promote themselves, putting together bespoke packages of support to attract specific investments.
- 2.6** Politicians and civil servants in the UK tend not to see things through the lens of investment decisions, instead focusing on their policy areas or department of state. **Government needs to adopt a mindset that recognises the extraordinarily competitive and fast moving world that manufacturers work in, and that thinks across the functions of government and its inevitable silos.**
- 2.7** Small and medium sized business in the advanced manufacturing supply chain are crucial to the overall success of the sector. Proximity and adjacency are important: they help strengthen relationships and

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- communication, allow for shared resources and spill-overs, and enable shorter and more efficient logistical chains. **We are more likely to have successful large firms if we have a thriving UK-based supply chain, and vice versa. We should never set the interests of large and small businesses against each other.** Not only are they interdependent – suppliers want anchor clients, who in turn want to be close to their suppliers – they also both benefit from the same investment environment.
- 2.8** It is wrong to think of smaller companies as ‘domestic’ versus larger international companies. Any advanced manufacturing company that wants to be sustainable in the long-term cannot rely entirely on the home market, so exporting is not an option but a necessity. The big difference is that small businesses find it harder to absorb the costs of complex processes, for example when interacting with public agencies over skills or funding schemes, or when applying for finance or support with exports. **Small businesses have a particular need for speed and simplicity in order to reduce unnecessary costs.**
- 2.9** **Industry has responsibilities to invest, to train, to act responsibly, to provide good employment, to support communities and to help meet our big challenges like environmental sustainability.** Business also needs to engage properly with government to solve problems, including through the Industry Sector Councils at national level and the Local Enterprise Partnerships at regional and local level.
- 2.10** **There is also an important role for unions, both representing their members’ interests and facilitating or safeguarding investment decisions.** UK manufacturers are not competing on the basis of labour costs with emerging economies, but labour flexibility remains extremely important.
- 2.11** **Productivity – the value of each hour worked – is the key to success for advanced economies like the UK that are competing with lower cost regions such as South East Asia.** Countries like Germany, the US and Japan sustain high wages because of very high productivity. We also need high productivity in the UK to help absorb the impact of a high sterling exchange rate.
- 2.12** **It is government that has the most important job in creating the right investment environment.** It is fundamental to improvements in productivity, particularly through support for innovation and through the skills system. It has a key role in relation to many of the costs faced by firms
- such as the cost of utilities, property, regulation and taxation. It also affects the supply of funding for company investment and growth, both through the mainstream banking sector and through publicly supported schemes. None of these individual factors dominates the investment environment: what matters is their overall balance, so government needs to act across the whole piece.
- 2.13** Costs matter as well as productivity. **We need to protect and improve the cost competitiveness of the UK as a manufacturing location, and strengthen the international perception that we are a cost-competitive country.** One type of cost stands out as a particular problem in the UK, and this is energy. The problem is not so much current energy costs as the medium-term implications of our current environmental regulatory strategy.
- 2.14** The UK must be among the world leaders in relation to climate change, both in terms of environmental regulation and the technological solutions to the problem. However, we should not unilaterally load UK industry with regulatory costs that make us uncompetitive compared to other advanced industrial countries, as this will eventually drive business away. **A full review of environmental energy regulation and taxation – including the Carbon Price Floor – should be published at the time of the first Spending Review in the next Parliament, with the objective of simplifying and stabilising the system and reducing costs to business.** Recent budget announcements to freeze the Carbon Price Floor have provided a stay of execution, but no long-term clarity or change of direction.
- 2.15** Taxes form a significant element of the cost base for firms. What matters is less any individual tax than the combined overall impact. Headline Corporation Tax in the UK has come down over many years to an internationally competitive level. **The headline rate of Corporation Tax is important – not least as a clear signal to businesses – but there are other important elements of the corporate tax base.**
- 2.16** Capital Allowances are particularly important for manufacturers because of their investment intensity, and these have become less generous as Corporation Tax has been reduced. Business Rates are also exceptionally high in the UK at around three times the OECD average. **The right ambition is an overall corporate tax environment that is internationally competitive, and that recognises the particular needs of advanced manufacturing as a capital-intensive business.**
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The next move should be to increase and stabilise the value of Capital Allowances to incentivise productive investment, particularly by small and medium sized enterprises. A comprehensive review of business property taxation should be completed in the first year of the next Parliament.

2.17 At the heart of all manufacturing success is a great product: one that people value and want to buy. At the heart of improvements in manufacturing efficiency are innovations in process. So product and process innovation are central to success for every advanced manufacturer. **Innovation is not just about bright ideas: it comes from a science base, a technology transfer system, an exceptionally skilled workforce, and the tax incentives and public spending that supports private investment in research and development.** So government plays a key role in the innovation environment.

2.18 **Additional spending on science and technology should be the first priority for any additional public resources to support advanced manufacturing.** As a country we spend far too little on research and development: China spends ten times more in absolute terms, while Slovenia and Estonia spend more as a proportion of their gross domestic product. We are just starting to invest in the organisations and systems that link research with business innovation, for example spending £440m in 2013 through the Technology Strategy Board. In the same year Germany spent £1.6bn on its Fraunhofer Institutes alone. Other countries see this agenda as a matter of foremost national importance. For example the Japanese Prime Minister personally chairs their Council for Science, Technology and Innovation. We have a lot of ground to make up in the face of exceptionally determined international competition.

2.19 At the moment the large science budget is ringfenced. **We should extend the ringfence to include both the £4.6bn science resource budget and the £440m technology budget administered by the Technology Strategy Board, and increase this total as soon as possible.** The Labour Party should commit to prioritising this area in its Zero Based Review of cross-government public spending. The R&D Tax Credit is now well understood and well established: it should be protected. Catapult centres – an initiative started under the previous government and supported by the current one in a good example of policy continuity – are a very promising initiative. However, we should not increase their numbers until significantly more resources are available, because the investments

required to succeed in technology are large: we must not ‘spread the jam’ thinly.

2.20 **The single biggest strategic challenge for advanced manufacturing in the UK is the availability of skilled people, at both technician (Advanced Apprentice) and degree level.** We are not educating nearly enough skilled apprentices or graduates to replace those retiring from manufacturing roles. As a colleague said to me in the early stages of my review, “We have a skills challenge in Germany. You have a skills crisis in the UK.” The rhetorical point is well made, but in fact we have a profound long-term problem rather than a crisis, particularly for smaller companies in the supply chain. Not only are they competing against large companies to attract skilled employees, it is also harder for them to provide apprenticeships or make up for skills deficits through on-the-job training.

2.21 The schools and further education system should get every young person at least to the ‘starting line’: a level of skill where they can begin an Advanced Apprenticeship or prepare for a degree. **However, in 2013 fully one in every three (36%) young people reached the age of 19 without achieving Level 2 skills including the equivalent of at least GCSE grade C in both maths and English.** Without these skills young people cannot even start the Level 3 apprenticeships that advanced manufacturing needs.

2.22 We should build on the major success of the past decade, which is increased take up at school of science, technology, engineering and maths qualifications. **Now we need to achieve genuine parity of esteem for ‘vocational’ and ‘academic’ qualifications, maintaining flexibility for young people to switch between the two for as long as possible.** We must also transform the number of young women choosing to translate their good GCSE science grades into higher and further study of STEM subjects.

2.23 We must double the number of engineering apprentices qualifying at advanced level – from 23,500 to 50,000 each year – by the end of the next Parliament, with corresponding increases in other manufacturing related areas. If we don’t achieve this, we will be far adrift of replacing the skills already leaving the system. In order to do so we should fully implement the recommendations of the recent Richard Review of Apprenticeships. As recommended by the more recent Husbands’ Review of Apprenticeships, **employers should have full ownership of the standards and public funding for apprenticeships, and**

the sector councils alongside the Local Enterprise Partnerships should take on greater responsibilities for expanding the supply of apprenticeship places by employers.

2.24 We must also dramatically expand the number of manufacturing related degree places, including for engineering, that are taken up by UK domiciled students. The good news is there are now many more young people leaving school well qualified to start engineering degrees: applications from UK based students increased by 39% over the nine years to 2011/12. However, acceptances only increased by 23% over the same period and graduations by just 6%: fewer than 800 additional graduates. **The supply of UK domiciled engineering graduates has not meaningfully increased in a decade and remains far below replacement level.**

2.25 Partly, this discrepancy is a time lag issue. Yet the number of engineering degrees awarded in the UK grew by 3,100 over the same period. **Non-EU students accounted for three-quarters of the increase in engineering degrees awarded by UK universities over the last decade.** This trend is even more marked for masters degrees. Over the nine years to 2011/12 the number of non-EU students gaining Engineering masters degrees in UK universities almost trebled, and they now outnumber UK students more than two to one.

2.26 We must revisit the crazy situation where we are using our best educators, in our elite universities, to train some of the finest young minds in the world, and we then send them home to work for our competitors whilst not training enough UK students. We send them away despite the fact that many want to work in the UK, in roles where there are serious skills shortages, in jobs that would generate growth and tax revenues for the UK. It is not for me to say what is the right overall level of immigration for the UK and I am not proposing any overall increase. **However, within the total immigration numbers we must make it easier for more highly skilled non-EU students graduating from our top universities with manufacturing related degrees to stay and work here.**

2.27 It takes four or five years for someone starting an advanced manufacturing apprenticeship to become a fully productive employee, and even longer for someone starting a degree. **In the short term we must consider how we can incentivise later retirement by skilled workers, allow more**

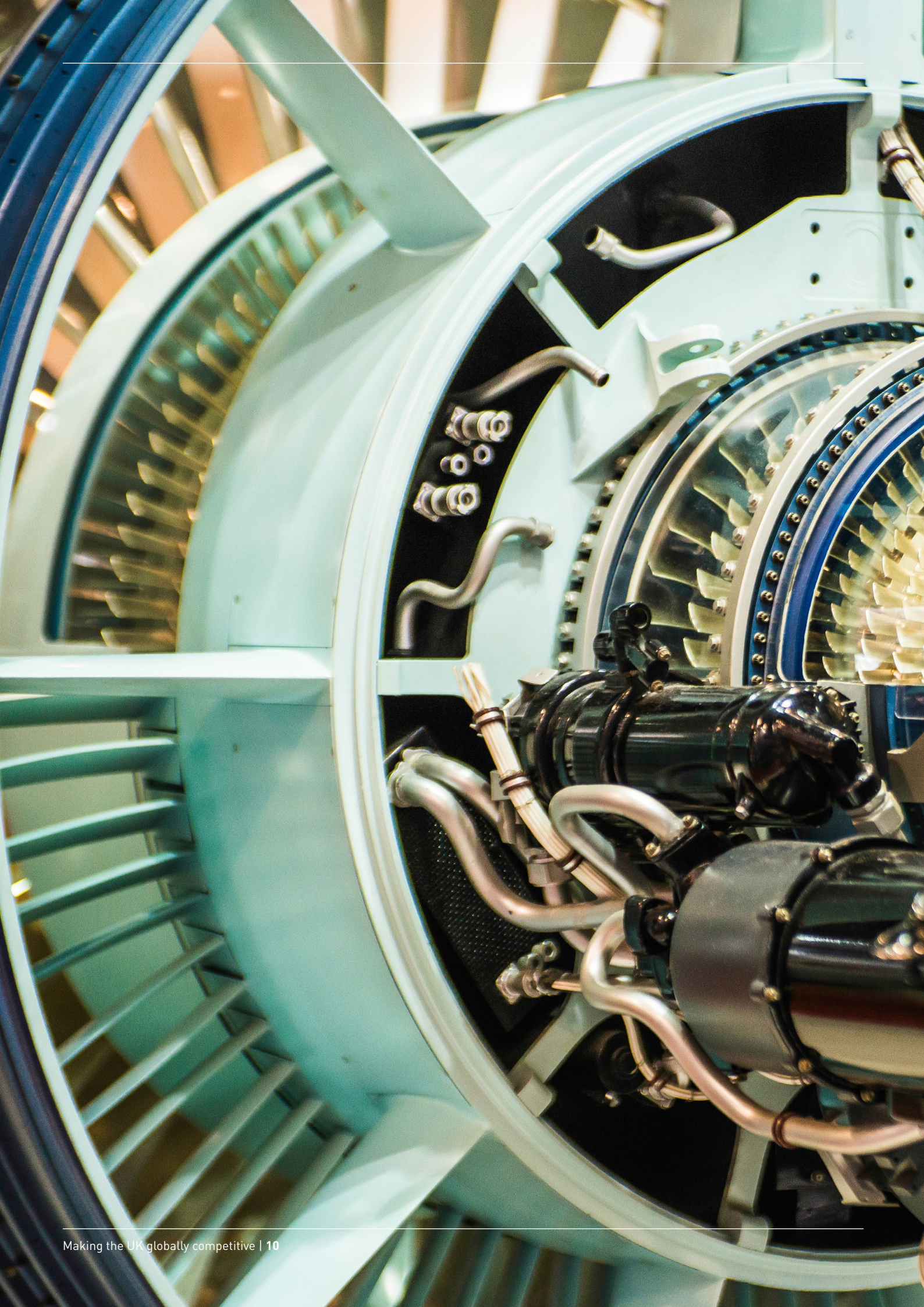
highly skilled non-EU graduates to stay and work in the sector, and enable more people who already have relevant skills to retrain into manufacturing.

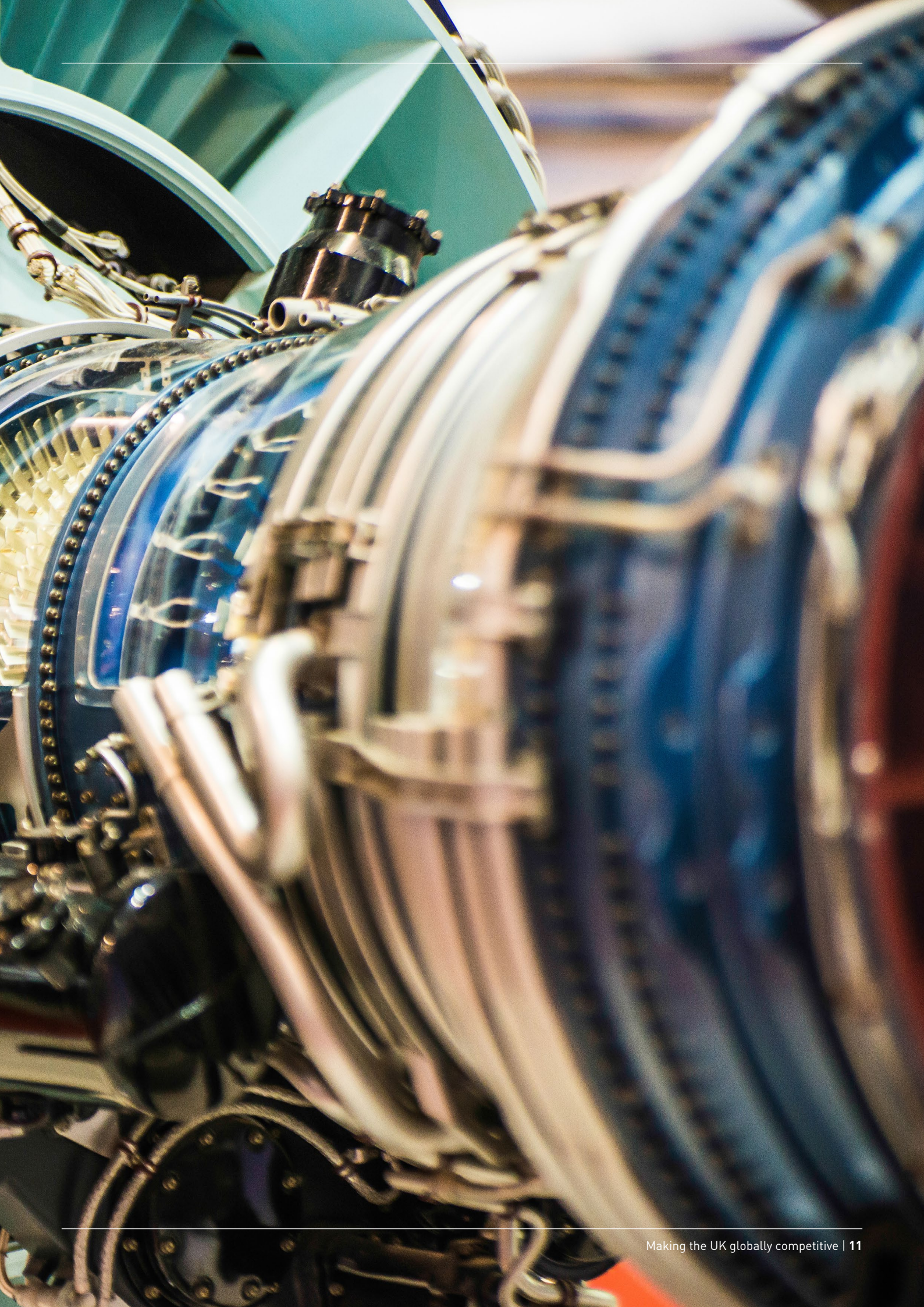
2.28 The final main area of the investment environment on which I focus is funding. Manufacturing in the UK has been particularly badly affected by the post-2008 credit crunch. Net lending by banks has been hit badly and has not recovered, loan rejection rates are much higher here than in the Eurozone, and collateral requirements are much higher too. More competition in the banking sector might help push the mainstream lenders into more imaginative and more proactive lending practices. **Businesses need to exercise creativity in seeking funding, and demonstrate acumen in the way they engage with potential funders. Banks need to rebuild their balance sheets whilst taking the opportunities of funding the growing advanced manufacturing sector.**

2.29 Government should not get into the business of providing large amounts of long-term capital to large businesses. However, **there is an important role for government in addressing finance gaps, particularly for smaller or highly innovative businesses that don't fit the mainstream banking model.** All the main political parties now support the idea of a 'British Business Bank' and the current government is establishing one now.

2.30 The British Business Bank should provide meaningful amounts of funding that is not available through the mainstream banking sector. It should focus on making the process of application simple, especially for small businesses. Decisions should be reached quickly, and in the case of positive decisions funds must flow quickly. **The Business Bank should reduce in number, simplify and improve the administrative efficiency of public funding schemes, and be the single 'front door' for all of them.**

2.31 **The Business Bank should have national sector-specialist capability, and regional presence to build relationships with businesses and Local Enterprise Partnerships.** It should quickly become self-funding to ensure its survival and stability. The Business Bank should not simply use the existing banks to take lending decisions and distribute its funds. More work needs to be done on how it will access and interact with its customers.





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- 2.32 What this adds up to is a modern, active industrial policy.** This is not about government ‘picking winners’, investing in large companies, or trying to plan the economy. It is about focusing on improving the environment in which companies operate, recognising the positive influence that government can have, and working together to tackle the challenges. It is about government working intelligently across its traditional silos to support businesses. And it is also about knowing when to recognise that business needs will determine the success of other policies. For example we should locate Enterprise Zones where they are most likely to make a genuine difference to investment decisions and support significant additional economic growth.
- 2.33** For 20 years the manufacturing sector was thought of as ‘beached’ by successive governments: left behind by the tide of our economic history. More recently we have had a reawakening to the sector’s importance and potential, and as a result the right direction of travel in policy terms. There are some important gaps, and we need to speed up and be more efficient. But **I am calling for evolution and greater determination, not revolution.**
- 2.34 Industrial policy needs to be strategic, long-term and stable, because major investment decisions are taken with a view to the long term.** For example, the decision to build a new automotive engine plant in the UK means the site is likely to be used for this purpose for at least 25 or 30 years. So the degree of perceived policy stability is extremely important, and cross-party consensus should be sought wherever possible. Our adversarial political culture, the electoral cycle, and the churn of government ministers all militate against this. So I propose two specific measures to stabilise the system.
- 2.35** The first such relates to the innovation system, where **I recommend the institution of a regular five-yearly review across the whole of innovation policy, with a ten-year horizon.** This Strategic Review of Innovation Support would consider all the major areas of government activity and spending related to innovation including the science and technology budgets, R&D Tax Credits and the Patent Box as well as the numerous programmes focused on specific innovation activities, technologies and processes. It would be the vehicle for evaluating the effectiveness and value for money of public support for innovation; considering the balance between its various different elements; ensuring we are targeting the right sectors, activities and technologies; and setting priorities for the coming ten years.
- 2.36** I recommend a second similar review across the wider system of industrial policy. At present the government identifies eleven key industry sectors, each of which has a sector council and sector strategy. **A five-yearly Strategic Review of Industrial Policy would evaluate the success of the existing industrial sector strategies; ensure that the identified sectors and themes are still appropriate, and identify the key strategic priorities looking forward ten years.** At the moment not all the sector strategies have sufficiently meaningful and measurable objectives against which they can be properly evaluated, and this should be rectified quickly.
- 2.37** The same need for stability applies to the institutions that support industry nationally – the industry sector councils – and the bodies that support local and regional development: the Local Enterprise Partnerships. **Evolution – not revolution – and devolution should be the watchwords for these national and local institutions.** We should be seeking to develop the existing bodies and devolve as much power, funding and responsibility to them as possible.

TEN KEY RECOMMENDATIONS

- 1 Politicians and policy makers should see manufacturing through the lens of business investment decisions, and focus on creating a globally competitive investment environment in the UK. This is the surest way to secure the success of our advanced manufacturing sector for the long term.
- 2 The UK should position itself as one of the leaders of the advanced economies on climate change, but must avoid unilateral regulatory costs that drive activity to other jurisdictions. A full review of environmental energy regulation and taxation – including the Carbon Price Floor – should be published at the time of the first Spending Review in the next Parliament, with the objective of simplifying and stabilising the system and reducing costs to business.
- 3 UK governments should commit to creating a globally competitive corporate taxation regime, taking into account the overall impact of all business taxes including the headline rate of Corporation Tax. The next move should be to increase and then stabilise the value of Capital Allowances to incentivise productive investment. A comprehensive review of business property taxation should be completed in the first year of the next Parliament.
- 4 Additional spending on science and technology should be the first priority for any additional public resources to support advanced manufacturing. At the moment the large science budget is ringfenced. We should extend the ringfence to include both the £4.6bn science budget and the £440m technology budget administered by the Technology Strategy Board, and increase this total as soon as possible. This should be identified as a priority in Labour's Zero Based Review of public spending. The R&D Tax Credit is now well understood and well established and should also be protected.
- 5 The Catapult centres are a promising initiative, and they should be protected and properly evaluated when they have had a chance to demonstrate their value. They should focus on deepening the links they create between the scientific research community and businesses, especially small and medium sized businesses. We should not increase their numbers at this time because the investments required to excel in technology are large: we must not 'spread the jam' thinly.
- 6 We must dramatically expand the number of manufacturing related degree places, including for engineering, that are taken up by UK domiciled students. However, our higher-level skills needs are too urgent for this to be sufficient. Within the total immigration numbers we must make it easier for more highly skilled non-EU students graduating from our top universities with manufacturing related degrees to stay and work here. We also need to consider ways to incentivise skilled older workers to delay retirement.
- 7 We must double the number of engineering apprentices qualifying at advanced level – from 23,500 to 50,000 each year – by the end of the next Parliament, with corresponding increases in other manufacturing related areas. We should fully implement the Richard Review of Apprenticeships. As recommended by the more recent Husbands' Review of Apprenticeships, employers should have full ownership of the standards and public funding for apprenticeships, and the sector councils alongside the Local Enterprise Partnerships should take on responsibilities for expanding supply. In addition we must continue to grow the pipeline of young people – especially women – who want to study for manufacturing related qualifications.
- 8 Businesses need to exercise creativity in seeking funding, and demonstrate acumen in the way they engage with potential funders. Banks need to rebuild their balance sheets whilst taking the opportunities of funding the growing advanced manufacturing sector.
- 9 The British Business Bank should act as the delivery mechanism for all the public funding schemes available to business. It should provide access to meaningful amounts of new funding, through an efficient and timely decision-making process. It should be the single 'front door' for all public funding schemes whilst simplifying and reducing them in number.
- 10 In order to stabilise policy for the long-term, we should introduce two regular five-yearly strategic reviews, each with a ten-year horizon, to be carried out at the beginning of each Parliament:
 - a. The Strategic Review of Innovation Support would consider all the major areas of government activity and spending related to innovation including the science and technology budgets, R&D Tax Credits and the Patent Box as well as the numerous programmes focused on specific innovation activities, technologies and processes. It would be the vehicle for evaluating the effectiveness and value for money of public support for innovation; considering the balance between its various different elements; ensuring we are targeting the right sectors, activities and technologies; and setting priorities for the coming ten years.
 - b. The Strategic Review of Industrial Policy would evaluate the success of the existing industrial sector strategies; ensure that the identified sectors and themes are still appropriate, and identify the key strategic priorities looking forward ten years. The sector strategies should be updated without delay so they all include meaningful and measurable objectives against which they can be properly evaluated.



3

APPROACH – AN INDEPENDENT REVIEW FROM THE BUSINESS PERSPECTIVE

3.1 This review was commissioned by Ed Balls MP, Shadow Chancellor, and Chuka Umunna MP, Shadow Secretary of State for Business, Innovation and Skills in September 2013. The original terms of reference were:

“The Wright Review will provide an independent report on how government should support innovative, high value and high technology manufacturing and related industries in the UK. The report will examine:

- How we create the right environment for long term growth in advanced manufacturing and related businesses including developing the advanced skills needed, access to finance, and generating investment and productivity in the sector.
- How to create the right environment for innovation and advanced product development in the UK, including strengthening the links between university research and manufacturing industry.
- How government should support UK manufacturing firms with international links, diverse markets and complex supply chains.”

3.2 **This is an independent report, and I have undertaken the work in an independent capacity.** I hope this work will be influential with all the political parties, within government and industry, and in public debate more widely.

3.3 In the UK we continue to face a very demanding fiscal challenge, and all the main political parties

are committed to bringing the current government budget at least into balance during the next Parliament¹. I have been cognisant of the constraints around public spending, and make no specific proposals for additional spending or tax cuts in this report. I do, however, identify areas where I think public support should be protected, and I also identify science and technology as the first priority for any additional public spending. There are also significant opportunities for shifting existing resources within the relevant government budgets.

3.4 I am very grateful to Jaguar Land Rover for allowing me the time to complete this review; for contributing to the call for evidence; and for hosting meetings of the expert group. However, Jaguar Land Rover should not be associated with the contents of my review, my conclusions or recommendations.

3.5 The scope of this report includes all advanced manufacturing in the UK. The largest such sectors are the aerospace, automotive, and pharmaceutical industries, but there are many other smaller sectors and many activities do not fit well within existing sector categories. Due to data limitations the analysis in this report often concerns the wider manufacturing sector or economy, in which case I try and draw out the most important differences with advanced manufacturing. There is one area of advanced manufacturing that I have deliberately excluded from consideration, and this is defence. Many of the key issues in defence manufacturing are both highly specific and bound up with defence procurement, and I have kept these out of scope.

3.6 The report considers small, medium and large companies, broadly using the conventional definitions of less than 50, 50-249, and 250 or more employees. The report also covers companies at different stages of their development, from start-up to maturity. A particular focus of the review is the large number of manufacturing businesses that supply intermediate products to other companies: the supply chain.

3.7 The review has been grounded in business experience. I have chosen my advisory Expert Group largely from the advanced manufacturing sector, rather than from government or academic backgrounds. Similarly, I have targeted my call for evidence at manufacturing companies and their representative organisations. My own background is as an automotive manufacturer. This report is not just a ‘wish list’ from business to government: businesses must recognise their own responsibilities in any properly functioning economic system, for example to train and invest. However, I want the authentic voice and concerns of business to come through clearly in this report.

3.8 The review draws extensively on published data from official UK and international sources, and it builds on much existing good work in the field of manufacturing and advanced manufacturing specifically. There have been numerous other independent and government-sponsored reviews relating to the issues I address in this report, as well as extensive academic and industry research. My review is not an exercise in primary academic research or systematic literature review, nor in detailed policy design. It is an attempt to achieve greater clarity and political consensus on the most important issues, including some that need urgent and sustained action at scale.

3.9 There is a long list of people I wish to thank for contributing to this project, and a full list of organisations and individuals is provided at appendix A. I should particularly like to thank Dr Ralf Speth, CEO at Jaguar Land Rover, and Lord the Professor Kumar Bhattacharyya, Chairman of the Warwick Manufacturing Group, for their support throughout. The members of my Expert Group have met to advise me on five occasions, and have provided first class insight and challenge despite their very demanding day jobs. All served in a personal and purely advisory capacity. They were:

- Sir John Armitt, Chairman, City & Guilds
- Sharon Bleach, Vice President Global Quality, AstraZeneca

- Sir George Cox, Director, NYSE Euronext, inter alia
- Andy Hinch, Port Sunlight Works Director, Unilever
- Juergen Maier, Managing Director, Siemens UK and Ireland
- Hamid Mughal, Global Director of Manufacturing, Rolls Royce
- Andrew Robb, Chairman, Tata Steel Europe
- Terry Scuoler, Chief Executive, EEF

3.10 Key sector representative organisations have supported the review with analytical presentations and evidence papers. These papers were important inputs to the relevant chapters of this report, and the original papers are available online. The organisations were:

- EEF the manufacturers’ organisation
- The Society of Motor Manufacturers and Traders
- ADS the aerospace, defence, security and space industries organisation.

PWC and KPMG kindly provided them in turn with analytical support. Numerous companies and other representative bodies including the CBI and TUC have given their time and expertise in meetings or responses to my call for evidence. I am grateful for all their input. Of course, the views expressed in this report remain entirely my own responsibility.

¹Institute for Fiscal Studies, Green Budget 2014

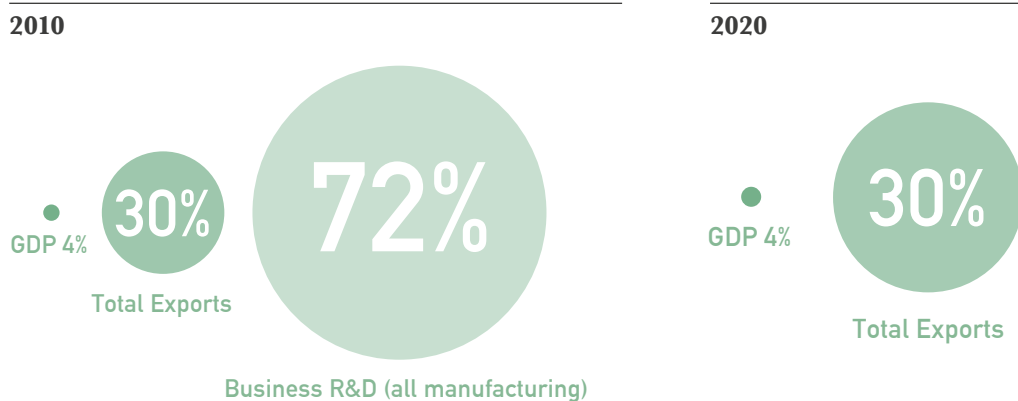
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THE CONTEXT: ADVANCED MANUFACTURING AND ITS SUPPLY CHAIN

4.1 We live in a world that is still industrialising. In 2010 one sixth of global GDP was accounted for by manufacturing. This will rise slightly to 2020 as developing and middle-income countries continue on their path of manufacturing and export driven growth. In the UK and other advanced developed nations, manufacturing as a whole has been falling over the long term as a share of national output. However, the composition of industry in these countries has also been changing, with advanced manufacturing making up a progressively larger share.

4.2 **Advanced manufacturing is a key strategic sector for the UK.** It has an impact far greater than its 4% share of GDP might suggest. It accounts for a disproportionate share of both business research and development and total exports. It is crucial to a sustainable recovery that is founded on investment in productive assets rather than on consumption and asset price inflation. Politicians of all parties say they want a balanced economy and a sustainable recovery. In that case, they need to get behind advanced manufacturing with the same seriousness that other national governments are doing in our competitor economies.

Figure 4.A: UK advanced manufacturing share of key economic measures

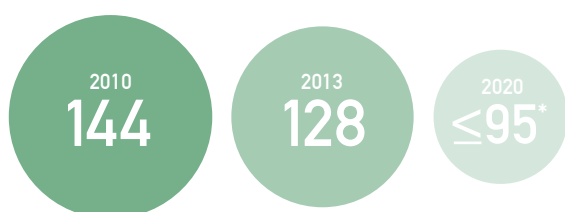


Note: Business R&D is for all manufacturing

4.3 As the Hesletine Growth Review² pointed out, we can only have sufficient growth if we have powerful engines of economic activity in all our cities and regions. In addition, we need businesses providing high levels of economic value added, and highly productive, well-paid jobs in every region and city to ensure a good spread of prosperity. Advanced manufacturing is largely based outside London and the South East, so it plays a crucial role in terms of achieving this economic balance across the whole country.

4.4 Advanced manufacturing is also central to meeting many of the biggest and most important challenges we face as a society. Sustainability and the need for a major reduction in our carbon intensity are prime examples. Companies are increasingly building sustainability into both their products and processes, partly to reduce their input costs, partly to meet regulatory requirements, but also to secure the consent of their customers. For example, one of Unilever's top-level strategic objectives is to double their sales at the same time as halving their environmental impact. In many other areas such as medical technology, communications, robotics, and energy, it is advanced manufacturing that holds the key.

Figure 4.B: Manufacturing technology is rapidly improving the emissions performance of new cars (average new car emissions, g/km CO²)



Note: 2020 Figure is the EU target

Advanced manufacturing is distinguished by its intensive use of knowledge and research

4.5 **Manufacturing is not the same thing as assembly.** It involves a cycle starting with ideas, design, research and development; through the processes of sourcing and production and assembly; to the servicing, modification and ultimately recycling of manufactured goods. This cycle is often called the value chain, because value is created at each stage.

4.6 Basic manufacturing of materials, commodity manufacturing of high-volume products like food and clothing, and the assembly of components designed and produced elsewhere are all important parts of our economy. However, advanced manufacturing is distinguished by its intensity of knowledge, research, design and development. These are particularly high-value parts of the value chain.

4.7 Advanced manufacturing in the UK is dominated by three large sectors: aerospace, automotive, and life sciences. There are other advanced sectors such as offshore wind or nuclear energy, and some world-beating specialist industries such as the extraordinary Formula 1 cluster. Some of the activities within many other manufacturing industries also have advanced characteristics, for example in construction, agricultural and food technology, and consumer goods. The arguments I make in this report are not at odds with the needs of these other sectors. They would all benefit from the broad approach I am advocating.

4.8 The manufacturing value chain looks very different now to ten years ago, and it is transforming again. It will be very different in the next ten and twenty years from now. Most obviously, it will be producing more advanced products with tremendously greater embedded knowledge and technology. This will require a different approach to product creation, with more global collaboration and massive use of research and data. Manufacturing processes will also transform, becoming not just much more efficient but also highly sustainable and rapidly flexible. Compared to ten years ago, many companies now allow significant individual customisation of their products in terms of specification and appearance. This trend will deepen and accelerate.

4.9 Manufacturing has moved on from being a vertically integrated activity, where R&D, production, marketing and services are primarily provided by the same company. It is increasingly characterised by highly complex networks, each addressing different parts of the value chain, and operating over many different local, regional, national and international geographies³. Proximity still matters in this world: it helps to strengthen relationships and communication, whilst clustering allows for shared resources and spill overs between companies. Physical adjacency enables shorter and more efficient logistical chains, which make a big difference to costs and productivity. Security of supply is also an increasingly well-

² No Stone Left Unturned In Pursuit of Growth, Lord Hesletine, 2012

³Srai, J and Christodoulou, P, Cambridge University Institute for Manufacturing, Capturing Value from Global Networks, 2014

recognised factor for companies, many of which were affected by disruption from the Japanese tsunami of 2011.

4.10 The supply chain in this new world will be a far cry from 'standard component' producers competing on cost. Advanced manufacturing suppliers are now often deeply involved in research and co-development with 'top tier' original equipment manufacturers (OEMs). Indeed we should move away from the traditional 'tiered' view of the supply chain: some suppliers are far larger than the companies that use their inputs.

4.11 So a strong domestic supply chain matters for the success of UK advanced manufacturing. We should be trying to capture more of the value of finished goods, with knock-on benefits for our national balance of payments. Perhaps most importantly, **the proximity of domestic suppliers will help advanced manufacturing innovate in terms of products and processes, be more flexible and responsive to customer demand, and more efficient.** It will be harder to have successful large manufacturers without a strong domestic supplier ecosystem. Vice versa, successful UK original equipment manufacturers are often important anchor clients for domestic suppliers who are also seeking to expand into export markets, and a powerful spur to small company growth.

Advanced manufacturing needs an open economy and access to export markets

4.12 Proximity and access to markets matter. Transport costs for some finished goods are significant, but in the advanced manufacturing sector many items are of high enough value that they can profitably be transported and sold far away from their place of manufacture. Companies in the supply chain benefit from being physically close to their major customers, who in turn also want them nearby to improve communication, flexibility and speed of product development. However, many supply chain companies need export markets for growth, economies of scale, and to diversify their risk.

4.13 As an open economy we benefit from significant inward investment and access to other markets in turn. On the one hand many UK companies have benefited from their relationships with overseas owners, and on the other there is a legitimate role for government in relation to scrutinising significant takeover bids to safeguard national interests. An open economy with a floating exchange rate also means that exporting companies are exposed to the risk of currency appreciation. This requires a 'margin of safety': UK companies need to be sufficiently productive that they can withstand a rising exchange rate.

4.14 One of the most important markets for UK advanced manufacturers is Europe. **We now export over £100bn of manufactured goods to the EU every year, and the stock of UK direct investment in Europe is similar in size⁵.** Manufacturers have a very clear view about our membership of the European Union, as expressed in the EEF's recent EU Election Manifesto⁶:

"While changing the EU is critical, manufacturers' support for Britain's membership is not conditional on this change."

4.15 Beyond Europe and of course North America, the BRICs countries (Brazil, Russia, India and China) are now well established as important export and supplier markets. Their share of total advanced manufacturing, both in terms of production and consumption, is rapidly increasing. Now the Next11 countries⁷ demand their place in the strategies of UK manufacturing companies and in public policy thinking. These macro changes in the balance of world economic power will rapidly change our position. **Even if the UK succeeds brilliantly as an economy, we will account for a progressively smaller share of world output and activity over the coming decades.** This puts an even greater premium on doing everything we can now to improve the UK environment for advanced manufacturing, which is particularly exposed to international competition and opportunities.

Government and businesses have different roles and different cultures, but must understand and work with each other

4.16 I have been struck throughout the course of the review by huge differences in the language, concerns and working practices of business and government. Just as it is difficult for business people to understand the intricacies of Whitehall and Westminster politics, **it is difficult for politicians and civil servants – unless they come recently from businesses themselves – to understand the fast-moving, competitive urgency of the modern advanced manufacturing environment.** Politicians and civil servants rightly have different concerns to business people. However, politicians and civil servants need to understand:

- the reality of how businesses make major and long term investment decisions,
- their overwhelming need for speed and efficiency in their day to day operations, and
- the ferocity of the competition we face.

4.17 Business will rightly be focused on shareholder value. However, as a country we will make less progress if businesses do not properly acknowledge:

- the fiscal constraints that make tax cuts and additional public spending so difficult at the moment,
- the need for government to be publicly accountable for the money it spends and the support it provides for businesses, and
- the importance of businesses investing serious time and energy engaging with public agencies to solve key policy issues.

4.18 Government has the most important role in creating the investment environment. This is not about propping up bad businesses, subsidies, or picking winners. However, all the key factors that firms take into account are fundamentally affected by government decisions such as those affecting the skills and innovation systems, the regulation of the financial system, and many of the costs affecting business.

4.19 **Businesses have important responsibilities beyond short-term profitability and their many legal and regulatory obligations.**

These include their role in:

- Improving the environmental sustainability of their products and processes, for example through reducing resource use and improvements in recyclability;
- Investing in the long-term success of their company, including in technology that may take many years to become commercially profitable;
- Training and developing their own current and future workforce, and supporting employment and skills more widely, for example through sector training arrangements;
- Investing in local communities, for example working with local schools and colleges to help more young people develop good skills and an understanding of the world of work; and
- Providing good quality employment, where exemplary health and safety sit alongside high productivity and constructive relationships with employee representatives.

These are not burdens that good businesses want to avoid. They are a recognition that companies are part of the fabric of our society as well as the building blocks of our economy. Both are stronger where government and businesses work together.

Good employee relations and a flexible workforce are vital to the competitiveness of advanced manufacturing

4.20 I have been grateful for the engagement of the TUC and Unite the Union with my review, both of which have responded to my call for evidence. UK manufacturers are not competing on the basis of labour costs with emerging economies, but labour flexibility remains extremely important. Good labour relationships that facilitate flexibility in working practices are key to the UK's continued competitiveness. As the Unite submission to the Review says:

“There are a number of industrial sectors in manufacturing and companies where employers and Unite have reached negotiated agreements regarding working in a flexible way. Those agreements have included new and flexible shift patterns which take into account work-life balance as well as production needs and which have been aimed at protecting employment, the creation of more secure jobs, better working conditions as well as improved productivity and competitiveness.”

This exemplifies **the important role for unions in the advanced manufacturing sector, both representing their members' immediate interests and facilitating or safeguarding investment decisions.**

³EEF, the manufacturers' organisation, 2014, Europe, a manifesto for growth

⁴Ibid. p.2

⁷Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, Vietnam, <http://www.goldmansachs.com/our-thinking/archive/archive-pdfs/brics-book/brics-chap-13.pdf>



5

INTERNATIONAL COMPETITIVENESS IS THE KEY TO OUR SUCCESS

- 5.1** This section sets out the broad approach we should take in order to secure the success of advanced manufacturing in the UK. The most important argument in the whole report is: **we should think about advanced manufacturing through the lens of the investment decisions companies have to make; and we should do everything we can to make the UK a more internationally competitive location for investment.** If politicians and policy makers really think like this, then they will come to the right policy conclusions of their own accord.
- 5.2** If we create an investment environment in the UK where advanced manufacturing can thrive, then five things will happen.
- Our existing world-leading businesses will continue to succeed despite the fierce challenges they face. They will be able to continue growing their sales, exports and profitability, and making major investments in the UK.
 - We will attract more physical investment into the UK by foreign companies, who will see the UK as a more attractive place to manufacture and from which to supply their markets.
 - We will see a greater number of smaller UK based companies survive and thrive to become the next generation of world-leaders.
 - We will build up new areas of comparative advantage, in new technologies and types of product, which will secure our long-term success as an advanced manufacturing nation.
- The UK will become an exemplar for manufacturing technology and processes that can be exported around the world.
- 5.3** However, there is no such assured future. **We are already behind many other advanced industrial countries in terms of our overall attractiveness as a manufacturing location.** Over the coming decade many rapidly developing countries will transform their skills base, innovation environment, and infrastructure. They will become progressively more attractive as investment locations, despite rising wages. Volatility and external shocks – fluctuations in demand, commodity price changes, currency movements, and supply chain risks – also require a margin of safety. The UK's current success in advanced manufacturing is certainly not secure in the medium and longer term.
- This is not just about inward investment: it applies just as much to UK companies**
- 5.4** Many politicians and policy makers would recognise that **the UK competes internationally for investment in manufacturing research, development, production and servicing facilities.** What is less well understood is that this applies not just to foreign companies considering investment in the UK, but to all companies – domestic as well as foreign – considering investments of any significant size. Multi-national companies with plants in several countries routinely hold internal competitions about where to site new investment. The final decisions are often taken in boardrooms on the other side of the world from the affected countries.

5.5 This does not just apply to wholly new investments either. Established companies must continually renew their facilities in order to keep them productive and competitive. At that point they will consider the alternative locations available to them, in the knowledge that if they do not remain competitive then they will not long remain in business. In most cases they will not have to remain in the UK.

5.6 There has been much discussion recently about ‘re-shoring’ of activity that was previously moved out of the UK, and which is now returning. Whilst important, re-shoring is in fact just one of three different kinds of potential investment in the UK:

- Re-shoring into the UK by domestic companies of activity that was previously moved abroad
- On-shoring into the UK by foreign companies of activity that was not previously carried out here
- Incremental investment decisions by companies – both foreign and domestic owned – that already have manufacturing activity here.

5.7 In summary, **whether advanced manufacturing exists in the UK at any significant scale in 10 or 20 years time will be determined by a series of investment decisions by companies between now and then.** This report goes on to make specific proposals about how we can improve the investment environment in various ways. However, the most important argument I am making for politicians and policy makers is that they should start to see the sector through this lens of investment decisions and global competitiveness.

5.8 **Other governments already see things through this lens, and it makes a big difference to their behaviour and attractiveness as an investment location.** For example, there is a growing cluster of automotive manufacturing in the southern states of the US. State government there will proactively reach out to global companies they think are considering a US investment. Top-level politicians from the region will proactively pitch their state as the place to locate a production facility. As well as helping with issues like regulatory compliance, land availability and transport links, they will align local skills and innovation systems with specific manufacturing activities. They will even help companies with the process of recruiting large numbers of new workers. This is a long way from where we are in the UK right now.

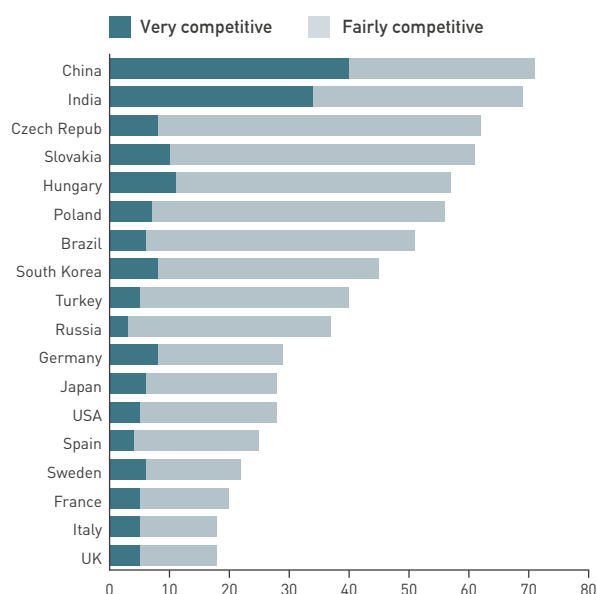
Recommendation I: Politicians and policy makers should see manufacturing through the lens of business investment decisions, and focus on creating a globally competitive investment environment in the UK. This is the surest way to secure the success of our advanced manufacturing sector for the long term.

Costs and productivity both matter

5.9 Two of the major components of the investment environment are costs and productivity. Investment decisions are certainly not based on raw labour costs. If this were true all production would have shifted to regions like Eastern Europe and China. **A country can still be an attractive location for investment despite a high cost base, but this requires very high productivity.** The result can be a competitive manufacturing industry with well-remunerated employees.

5.10 It is certainly the case that **the UK is perceived as an expensive manufacturing location.** Recent work by Ernst and Young in fact places the UK as bottom of its league table of major automotive manufacturing locations with respect to perceived cost competitiveness.

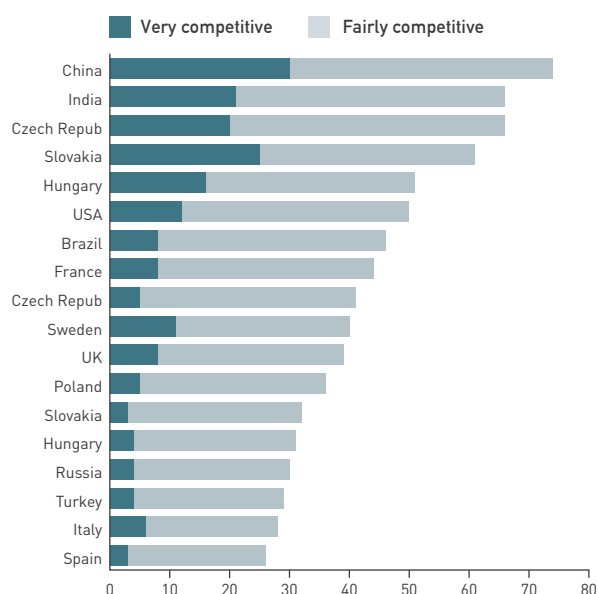
Figure 5.A: Perceived competitiveness of automotive hubs with respect to manufacturing costs, 2013



Note: Phone survey of 300 companies active in the European automotive industry, 15% OEMs, 85% suppliers

Source: Ernst & Young European Automotive Survey 2013

Figure 5.B: Perceived competitiveness of automotive hubs with respect to productivity, 2013



Note: Phone survey of 300 companies active in the European automotive industry, 15% OEMs, 85% suppliers

Source: Ernst & Young European Automotive Survey 2013

5.11 As we might expect, it is the large emerging economies that are seen as having the lowest costs. However, it is worth examining the position of some notably successful manufacturing countries. Germany does little better than the UK in terms of perceived cost competitiveness. But when the same group of companies were asked about their perceptions of productivity in different countries, it becomes clear why Germany is nonetheless an attractive place for investment: it is seen as exceptionally productive. A similar pattern can be seen for Japan and the USA: perceptions of high costs are balanced by perceptions of high productivity. **The problem for the UK is that our costs are seen to be high, and our productivity is seen to be mediocre. We need to address both.**

Governments must focus on improving the whole investment environment – no one factor dominates

5.12 **It is the full range of costs, benefits, and the availability of resources, plus expectations and perceptions that drive investment decisions.** It is across this whole range of issues that the UK needs to be competitive compared to other jurisdictions. No one factor dominates decision-making.

5.13 The UK is fortunate to have some long-standing advantages, including the English language. We also have a reputation for probity in the public and private sectors, a track record of respect for intellectual property, and a well-regarded legal system. However, the UK has a poor reputation in terms of a frequently changing regulatory environment, and damaging instability in policy areas including skills and infrastructure planning. **Our intensely adversarial political system does not help create stability for businesses.**

5.14 Many investment decisions in the advanced manufacturing sector have long-term implications. For example, the decision to build a new automotive engine plant in the UK means the site is likely to be used for this purpose for at least 25 or 30 years. Conversely, the decision to locate such a plant elsewhere forecloses that opportunity to the UK for the same period. Given the long-term nature of these decisions, the degree of perceived stability in the investment environment is extremely important. **One or two years of beneficial costs in some particular respect are insignificant compared to a high degree of subsequent uncertainty.** What matters more is the perception of long-term stability by the companies and individuals taking these decisions.

5.15 **The investment environment does not just affect large companies making major investments, but also smaller manufacturing companies seeking to develop and grow more organically.** Small firms face particular challenges, for example in relation to access to bank finance, simply because of their small size and sometimes relatively short trading record. Some issues that large firms can manage ‘in house’, such as specialist training, require external support or coordination across a number of smaller firms.

5.16 In addition **small firms have a particularly pressing need for simplicity in their interactions with government, as the time cost to them is relatively higher.** Overall, however, there is much in common between large and small firms in terms of their need for a competitive investment environment, and it is a mistake for policy makers to try and set the interests of large and small businesses against each other.

5.17 The future of advanced manufacturing in the UK depends entirely on how seriously we address the challenge of making our country a globally competitive investment environment. Other countries are already taking this challenge very seriously indeed. In my view, if we are to compete with them, then we should focus particularly on four specific areas. In each case, competitor countries are making concerted efforts to improve their position. In each case there are major strategic challenges for the UK. And in each case government has a key role to play in securing the right future for the UK.

- **The cost environment**, especially environmental regulation and business taxation
- **The innovation environment**, including public and private investment in science and technology
- **The skills environment**, including the short term and longer term supply of apprentice and degree level skills
- **Funding for growth and investment**, especially for small and medium sized businesses.

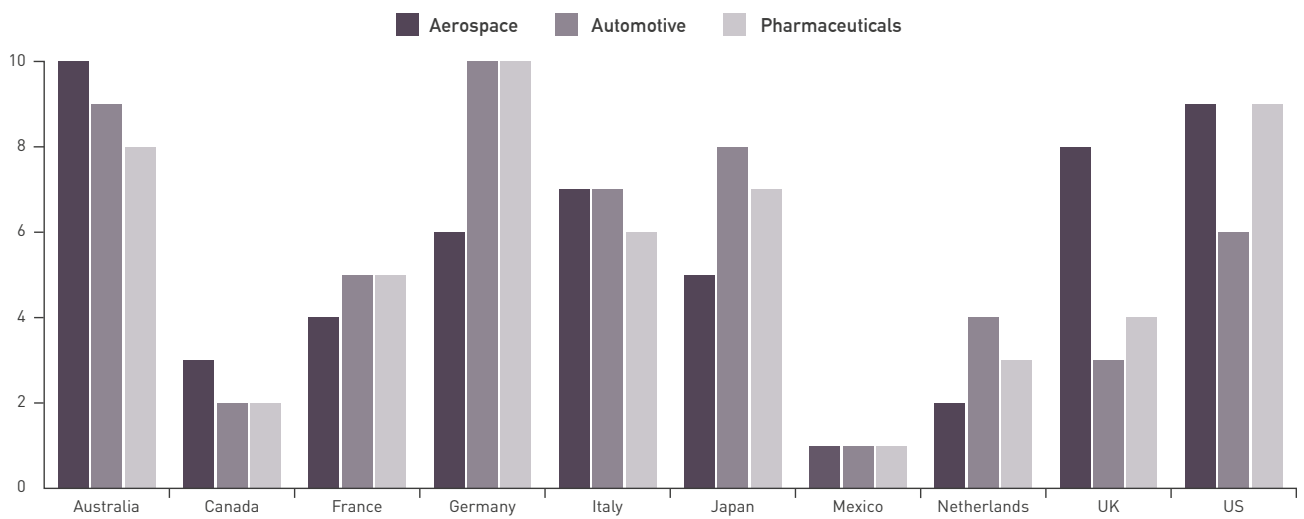
These four areas, plus the governance of industrial policy, are the focus of the remainder of this report.



IMPROVING THE COST ENVIRONMENT, ESPECIALLY ENERGY COSTS AND BUSINESS TAXATION⁸

- 6.1** It is one thing to say that an economy like Germany can have a high cost base and still be a successful manufacturing nation. But it would be absolutely wrong to draw the conclusion that costs do not matter in the UK. Firstly, despite some highly productive plants and companies, we are far less productive overall than Germany. Secondly, the Germans recognise their own high costs as a problem, and will take serious action to improve matters. Thirdly, the productivity of low cost countries will continue to improve over the coming years.
- 6.2** We need to improve our national productivity, and the next two sections of this report focus on two of the most important ways we can do this: through improving the innovation environment and improving the supply of skilled people. However, we also need to protect and improve our cost competitiveness. This section focuses on costs that vary between different countries, particularly the costs of labour, energy, transport, property and taxes.
- Defining the cost base and seizing the opportunity in the UK**
- 6.3** The cost base for any firm is made up of many different elements. **What matters is the total cost base: the overall impact of all the various elements.** Manufacturing firms also now think strategically about the costs of their supply chain, not just about the unit cost of individual components. This means managing the ‘total delivered cost,’ which takes account of transport costs, working capital tied up in transit of goods, and the risks of a complex and extended supply chain that may be disrupted by human or natural events.
- 6.4** The UK manufacturing supply chain was particularly badly affected over the 1990s and early 2000s due to a lack of cost competitiveness. A focus at that time on component costs meant UK firms often could not compete with suppliers in emerging markets. Now that large firms recognise the value of close working relationships with their supply chains and the value of geographical proximity and security, we have an opportunity to rebuild.
- 6.5** It is challenging to produce a robust assessment of the UK cost environment in comparison with other countries. This is because the actual costs borne by firms are not usually publicly available, and they vary widely between different firms and sectors. However, extensive work has been done in this area by KPMG, most recently in 2014.
- 6.6** The KPMG work models the costs of a representative manufacturing facility in different locations and across a wide range of industry sectors. The example plant they use is a medium sized firm in the supply chain, usually with around 100 employees, modest expenditure on R&D, and sales of some tens of millions of dollars per annum. Whilst actual costs will be very different for larger firms than this, comparing similar facilities in different locations does allow us to compare countries on a similar basis. The cost ranking for the UK’s three largest advanced manufacturing sectors is shown below, against the nine other countries highlighted by the KPMG study.

Figure 6.A: Country ranks for cost competitiveness in key advanced manufacturing sectors, drawn from KPMG ‘Competitive alternatives 2014’. 1 is best, 10 worst.



Source: <http://www.competitivealternatives.com>

Note: Country ranks are derived from modelled exemplar manufacturing facilities. These are medium sized businesses in the supply chain for each sector. Detailed assumptions and results by individual cost factor are available from the linked source

6.7 On this analysis the UK appears to be broadly mid-table overall in terms of the costs affecting our major advanced manufacturing sectors. In the automotive and pharmaceutical sectors, the UK compares favourably with France, Germany, Italy, Japan and the US. In the aerospace sector the UK appears more expensive.

6.8 SMMT has looked in detail at the components of the UK automotive manufacturing cost base, in order to identify the areas of relative strength and weakness. The SMMT analysis highlights two particular areas of advantage for the UK cost base: **our relatively good labour flexibility and low statutory labour costs (i.e. the non-wage costs necessarily incurred from employing workers), and the openness of our economy (including barriers to exit and tariffs).** These are advantages we should protect.

6.9 However, the SMMT analysis also highlights that in many other areas the UK cost base looks distinctly un-competitive, and the overall position is fragile. In particular **property taxes in the UK are exceptionally high, and transport and utility costs are high.** These are the areas we should seek to improve.

Case Study: Labour flexibility at GM Ellesmere Port.

To win the contract to build the next Astra from 2015, UK management and unions signed a ground-breaking labour agreement which made retaining Ellesmere Port viable. This includes a four-year pay deal and allows for 24-hour working for 51 weeks of the year should demand justify this. Not only was the UK factory retained, but it was also designated the lead plant, ahead of Gliwice in Poland, for the new Astra from 2015. £125m is being invested in the UK for the new model, and GM has also committed to raising UK content on the new Vauxhall Astra.

Source: SMMT paper for Wright Review

Controlling energy costs

6.10 Over recent years a similar pattern of significant and continued rises in both gas and electricity prices has affected domestic and industrial energy users. These long-term increasing price trends affect many other advanced manufacturing countries. The notable exception is the US, where the boom in fracking has sent gas prices in the opposite direction. At present our

*This section draws extensively on the evidence paper “The Cost Base of the UK Supply Chain: perspectives from the automotive industry” provided by SMMT for the Wright Review. It is published alongside this report at www.thewrightreport.net

electricity prices are somewhat higher than in mainland Europe, and our gas prices somewhat lower, but we face broadly the same underlying costs of energy.

- 6.11** The real problem is the future increases in UK energy costs that would flow from the implementation of the UK's current approach to environmental taxation. For example, the Carbon Price Floor was set to rise by over 80% in 2015-16 to £18t/CO², equivalent to around 10% of a large user's electricity bill. EEF calculates that this will mean UK-based companies will face a carbon price four to five times higher than the remainder of the EU in relation to electricity consumption.
- 6.12** It is right that the UK should be among the leaders of international action against climate change. However, if we load too much cost onto industrial energy prices in the name of reducing energy use and carbon emissions, we will not only make the UK uncompetitive as a location for many manufacturing companies. We will also drive manufacturing activity into less environmentally demanding jurisdictions.
- 6.13** The recent announcements in Budget 2014 relating to the Climate Change Levy begin to recognise the problem by capping some of the regulatory costs from 2015-16 out to 2019-20. This is welcome in the sense that if the planned rises had been implemented, we could by the end of this period have ended up with industrial energy prices double or three times that of our major competitors.
- 6.14** However, there is the world of difference between holding back from implementing a bad strategy, and accepting the need for long-term and far-reaching reform. We now have a very complex regulatory and environmental taxation regime, many elements of which do not apply to our international competitors. At the same time we have been given a 'stay of execution' by a government that appears to recognise the impact this approach would have on our competitiveness. This combination creates great

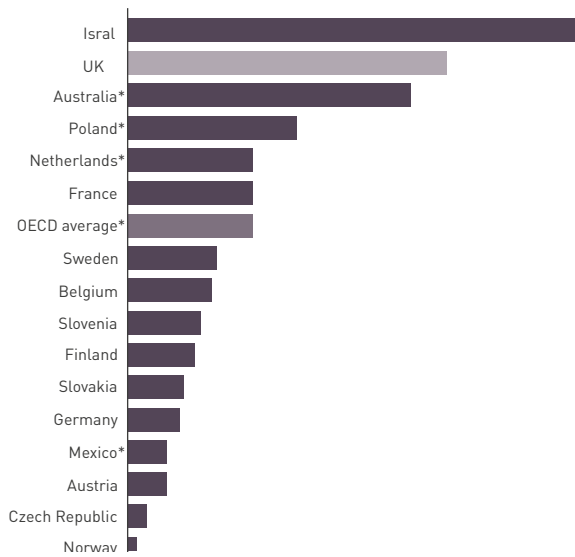
Recommendation II: The UK should position itself as one of the leaders of the advanced economies on climate change, but must avoid unilateral regulatory costs that drive activity to other jurisdictions. A full review of environmental energy regulation and taxation – including the Carbon Price Floor – should be published at the time of the first Spending Review in the next Parliament, with the objective of simplifying and stabilising the system and reducing costs to business.

uncertainty, send absolutely the wrong signals to business, and risks having a serious impact on long-term investment decisions.

Business taxation

- 6.15** Taxes are a major cost for manufacturing businesses, and the nature of advanced manufacturing has particular tax consequences. Firstly, it is relatively cyclical, with periods of high profitability that generate high tax liabilities, and periods of contraction that can generate losses and write-offs. It is also highly capital intensive, so the specific tax treatment of investment matters a lot. Finally, manufacturing generally requires buildings and facilities that are large compared to offices. As such the main corporate tax categories – Corporation Tax, investment allowances and property taxes – have particular implications for advanced manufacturing.
- 6.16** Reforming the Corporation Tax regime has been on the agenda for successive governments since 2007. As a result, the UK main rate of corporation tax now compares well with similar advanced developed countries. The main UK Corporation Tax will be 20% by 2015/16, with lower rates for small profits and firms.
- 6.17** Corporation Tax is important partly because it is one of the main taxes paid by business, but also because it is a powerful and easily understood signal. However, as part of this ongoing strategy to reduce Corporation Tax, Capital Allowances for depreciation have been simplified and rates cut. Capital Allowances for plant and machinery (in the main pool) were rated at 25% in 2008/09 and are now at 18%, with a lower rate at 8%.
- 6.18** Every business is now entitled to an Annual Investment Allowance, a 100% deduction on capital expenditure on plant and machinery from taxable profits up to a set value cap, currently at £0.5m, a level which will remain until December 2015. While the value of this incentive is welcome, the instability and restrictions to certain classes of asset is not. In recent comparison of capital allowances in 41 countries worldwide by the Oxford Centre for Business Taxation, the UK was ranked 28th for plant and machinery, 41st (i.e. last) for Industrial Buildings and 14th for Intangible Property.
- 6.19** The Institute for Fiscal Studies' Green Budget Report 2014 uses OECD data to show how, with the exception of Israel, the UK has the highest share of tax receipts from recurrent taxes on non-domestic immovable property (Business Rates) as a share of national income. The UK's share at about 1.6% of national income is three times the 0.5% average of all OECD countries.

Figure 6.B: Receipts from current taxes on non-domestic immovable property as a share of national income, 2011



Source: IFS Green Budget 2014, figure 11.3
 * = data from 2010.

6.20 What matters is the combined impact of all the main business taxes. I am not calling for specific tax cuts, although a long-term reform of property taxes is clearly required. Instead, we need shared cross-party ambition to achieve a globally competitive corporate tax environment overall. Then we need to signal this strongly to potential investors, both domestic and foreign.

Recommendation III: UK governments should commit to creating a globally competitive corporate taxation regime, taking into account the overall impact of all business taxes including the headline rate of Corporation Tax. The next move should be to increase and then stabilise the value of Capital Allowances to incentivise productive investment. A comprehensive review of business property taxation should be completed in the first year of the next Parliament.

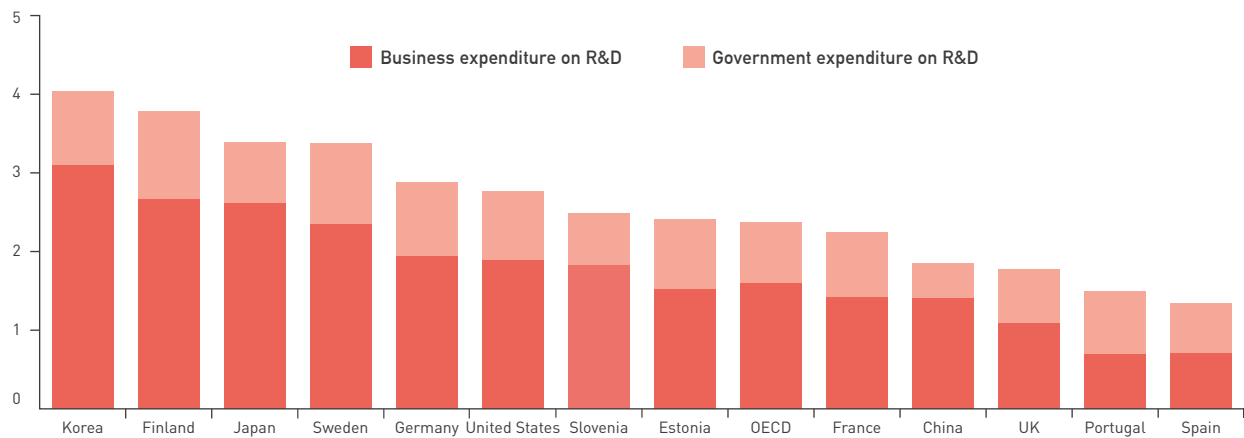


7

THE INNOVATION IMPERATIVE – SCIENCE, TECHNOLOGY, RESEARCH AND DEVELOPMENT¹⁰

- 7.1** At the heart of all manufacturing success is a great product: one that people value and want to buy. At the heart of improvements in manufacturing efficiency are innovations in process. So **product and process innovation are central to success for every advanced manufacturer.** Innovation makes the things we need cheaper and better, and reduces the amount of resources required to create and use them. It also makes us feel better-off in a way that is not captured by the normal measures of GDP: the fact your mobile device is now massively more powerful than ten years ago is not reflected in its value as part of GDP.
- 7.2** **Innovation is also the key to our global society's big challenges.** Innovation means we can now fly safely around the world, communicate instantly through the internet, and treat diseases that would once have killed us. The next generation of big challenges – from supporting an ageing population, to transforming our environmental sustainability, to managing more and more complex global systems – all require innovative manufactured products. The companies that meet these challenges successfully will in turn see huge rewards.
- 7.3** Government has a central role in creating the right environment for innovation: one where companies can rapidly access and use the latest knowledge in ways that translate into commercial success. All the advanced economies around the world recognise this and invest significant public resources as a result. **We must recognise that the UK spends far less as an overall share of GDP in support of innovation, and that many areas of innovation now require massive resources and long-term commitments.** So as well as raising the level of spending on innovation, we have to ensure we achieve critical mass in the right areas. If we try and spread the jam too thinly, we will be left behind.
- 7.4** **Research and development: the engine of innovation**
- 7.4** **The importance of innovation to manufacturers is reflected by high levels of research and development expenditure in this sector.** Whilst the manufacturing sector represents about 11% of total UK economic output, it accounts for 72% of Business Expenditure on R&D across the whole economy¹¹. Large firms account for a large majority of R&D activity: those with 250 or more employees were responsible for 80% of business R&D in the UK in 2011¹². This pattern, with large firms dominating the overall expenditure, is mirrored in other large advanced economies such as the US, Germany, and Japan.
- 7.5** **The low overall level of R&D spending in the UK is a major risk to our long-term national prosperity.** As the chart below shows, total R&D spending in the UK is far below the level of our major international competitors. It is private rather than public spending that really falls short in the UK. Business expenditure on R&D in the UK, at 1.1% of GDP in 2011, was well below the OECD average of 1.6%, just over half that of the US and Germany, and way behind international leaders like Japan, Finland and Korea. The UK spends less on R&D as a share

Figure 7.A: Business and government expenditure on research & development as % of GDP, countries selected for illustration, 2011



Source: OECD Science, Technology and Industry scoreboard 2013, figs 2.1.2 and 2.10.1 combined

of GDP than Slovenia and Estonia, whilst China now spends more than ten times as much as the UK on R&D each year in absolute terms. To use one form of investment as an example, China is now the world's largest buyer of industrial robots – ahead of Japan, South Korea, and the US – purchasing 36,560 robots in 2013 compared to 2,486 purchased in the UK. These are transformational levels of investment.

7.6 Of course R&D expenditure is 'only' an input, and the really valuable output is innovation: we need to worry about the efficiency of science and innovation spending as well as the overall level. But it would be foolish arrogance to think we can rely on being more efficient in our R&D spending in order to compensate for sustained inadequate investment. **Unless we increase our overall level of national R&D, the UK will fall behind more and more countries in terms of innovation performance.**

7.7 Given the low level of private R&D spending in the UK, **it is clear that we must create an environment in which R&D expenditure is more attractive to companies.**

Many areas of government policy – most obviously skills policy – will have an important impact on the returns to private R&D spending. However, there is a vital role here for greater direct government expenditure as well. Across countries there is a positive correlation between the level of government and business R&D spending, and evidence that public spending in this area helps 'crowd in' private investment.

The innovation cycle and public support: from basic research to commercialisation

7.8 Innovation is a cycle stretching from basic research, through applied research to commercialisation. The UK has well-recognised strengths in its university research base.

¹⁰This section draws extensively on the evidence paper "Developing innovation support for the success of manufacturing and its supply chain" provided by EEF for the Wright Review. It is published alongside this report at www.thewrightreport.net

¹¹EEF, the manufacturers' organisation, 2014, Wright Review supporting paper on innovation

¹²Note: Medium sized firms with 50-249 employees accounted for 15%, and smaller firms for just under 6%. Source: OECD Science, Technology and Industry scoreboard 2013, Fig. 2.10.2

As Sir Andrew Witty’s review of Universities and Growth succinctly put it:

“The UK’s research base is world class and internationally renowned: second in the world only to the USA for number of citations, and the most productive in the G8. With only 1 per cent of the world population the UK produces 6.9 per cent of world publications, receives 10.9 per cent of citations and 13.8 per cent of citations with highest impact... The UK has more universities near the top of the world rankings than any country other than the USA.”¹³

described in one of their supporting papers for this Review:

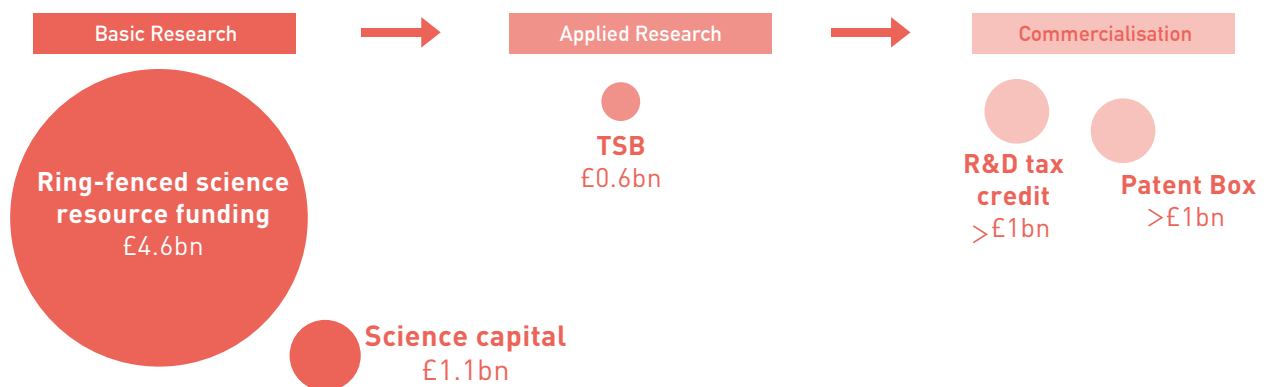
“An individual company cannot always capture the full benefits of their innovation, but faces all of the costs... In addition, some innovations, which may be significant drivers of growth in the future, are a long way from market, and can be disruptive technologies which have to compete with incumbent technologies with existing infrastructures in place. This can put firms off investing in innovation, and is a particular barrier for smaller companies.”¹⁴

7.9 In the UK, our traditional weakness has been the middle section of the cycle: turning basic research into commercial products. This has become known as ‘the valley of death’. Much recent innovation policy has rightly been focused on helping ideas get across this valley, and into profitable production.

7.10 Whilst innovation is often crucial to firms’ success, there are good reasons why the whole-economy level of research and development will be lower than is optimal. Innovation is subject to important market failures. As the EEF, the manufacturers’ organisation

7.11 These factors are reflected in significant government support for innovation in all advanced industrial economies. Such support includes public funding for basic research; tax reliefs and allowances for companies undertaking innovative activity; and programmes, organisations and infrastructure aimed at helping innovations make the difficult journey from idea to market. The current pattern in the UK is one of relatively strong support for basic research, relatively little for applied research, and moderate support for commercialisation. The high profile ring-fence is around the largest element of this money: science resource funding.

Figure 7.B: The balance of funding across basic research, applied research and commercialisation



Source: EEF supporting paper, from Spending Review Allocations 2015/16 and OBR

7.12 Some innovation support policies are ‘targeted’ in that they require government or its agencies to make decisions about which companies, projects or technologies to support. Others are ‘neutral’ and require no such active decisions. The R&D Tax Credit is a good example of ‘neutral’ innovation support: companies which engage in qualifying R&D receive the credit regardless of the precise nature of their work. It is also a good example of how policy stability is a virtue.

7.13 In a recent EEF survey of innovation support policies, the R&D tax credit was clearly the scheme with the highest level of use by respondents¹⁵. Civil servants will always worry that such policies may be incentivising activity that would have occurred anyway – that they are incurring significant ‘deadweight’ costs. But **the temptation to withdraw or substantially tinker with the R&D Tax Credit should be resisted. It is well understood, well used, and recent changes in the detail of the scheme have improved it.** We should be especially wary of the term ‘deadweight’ in this area: R&D activity has considerable spillover value, and it matters less who funds it than that more of it happens. We should maintain and when possible increase the value of the R&D Tax Credit.

7.14 The more recently introduced Patent Box scheme is another ‘neutral’ innovation support policy. This scheme provides a lower corporation tax rate of 10% for UK profits derived from products that incorporate qualifying patents. The total cost in terms of tax revenues foregone – and therefore the benefits in terms of gains for companies – is estimated to be around a billion pounds per annum when the scheme is fully up and running. Just as the R&D tax credit incentivises the early stages of innovation, the Patent Box looks like a potentially valuable complement, incentivising the later stages of commercialisation. The scheme is relatively complex, requiring calculation of qualifying profits in accordance with complex rules. More significantly, it does not reward innovative activity that is not specified in patents even if that activity is similar in nature and value. However, on balance **the Patent Box scheme should be allowed to come to fruition and then be properly evaluated.**

Targeted support for innovation is also important

7.15 The Technology Strategy Board (TSB) plays a crucial role in the public support of innovation, especially in relation to ‘targeted’ support that is focused on particular sectors or technologies. Created in 2007, it is an executive non-departmental public body of the Department for Business Innovation and Skills. Whilst its core funding comes from government, business is closely involved both with the governance of the TSB, and in co-funding individual projects within programmes for which the TSB is responsible. These include the Knowledge Transfer Partnerships, Knowledge Transfer Networks, Collaborative Research and Development, Smart, Innovation Vouchers and the network of Catapult centres. This report will not try to evaluate or comment on all of these schemes. Broadly speaking I have encountered support for the TSB and its work, and support for the idea that it should be focused on delivering its current remit rather than this being extended.

7.16 **The model of government support for technology and innovation programmes and projects, co-funded by the public and private sectors, is one that other countries have been pursuing at scale for some time.** Some of the nations with the most impressive innovation track records support this kind of activity at a hugely greater scale than the UK. For example, the table below shows the level of such public funding in Germany and Finland, as a proportion of GDP, is twice and ten times respectively that of the UK. These are serious levels of national commitment: Finland invests the same in absolute terms as the UK, despite having an economy one-tenth the size of the UK. In the cases of these two countries the balance of funding between basic and applied research is also different from that in the UK. Here the balance is roughly 90:10 compared to 75:25 in Germany and Finland¹⁶.

¹⁵Encouraging a British Invention Revolution: Sir Andrew Witty’s Review of Universities and Growth, 2013, para 3.1

¹⁴EEF, the manufacturers’ organisation, 2014, Wright Review supporting paper on innovation

¹⁵Source: EEF/NatWest Innovation Monitor 2013

¹⁶EEF evidence paper to Wright Review

Country	Innovation Body	Budget 2013 (£mn) (€1 = £0.86)	Budget as a % of GDP
UK	Technology Strategy Board	440	0.03
Germany	Fraunhofer Institutes	1600	0.07
Finland	TEKES	490	0.29

Source: BIS, 2014; Sources: Innovation Bodies' websites; Eurostat

7.17 There is no obviously right answer to the question of what this balance should be in the UK. What is clear is that we are in the early stages of building up the capacity and capability for industrial innovation, and that there are good reasons to believe this will help address historic weaknesses. The danger is that the relatively small budget for innovation is squeezed by the fiscal crunch and the much larger budget for science. **We should extend the current ring-fence so that it includes both science and technology. This would protect overall spending in this area, and open up the possibility of transfers between them on the basis of impact and value for money.**

Recommendation IV: Additional spending on science and technology should be the first priority for any additional public resources to support advanced manufacturing. At the moment the large science budget is ringfenced. We should extend the ringfence to include both the £4.6bn science budget and the £440m technology budget administered by the Technology Strategy Board, and increase this total as soon as possible. This should be identified as a priority in Labour's Zero Based Review of public spending. The R&D Tax Credit is now well understood and well established and should also be protected.

The new Catapult Centres are an important new addition to the innovation landscape

7.18 One of the most important recent changes in the public support of business innovation in the UK is the new network of Catapult centres. The Catapults were created following Dr Hermann Hauser's 2010 review of the potential role of technology and innovation centres in the UK¹⁷. **The Hauser Review was commissioned and published under the previous Labour government, and the incoming Coalition chose to support its**

recommendations. This is a good example of the power of cross-party consensus on issues of strategic importance.

7.19 Catapults are physical centres where businesses, scientists and engineers work together to develop innovative ideas into commercial products and processes. The funding comes from a mixture (roughly thirds) of company investment, core public funding, and contested public funding. There are currently seven Catapults¹⁸, including a High Value Manufacturing Catapult with seven specialist centres¹⁹.

7.20 The physical centres are similar to modern manufacturing facilities, but in which dozens of companies and researchers experiment with shared equipment and other facilities. Some of the key barriers to innovation for individual companies – especially smaller and medium sized companies – are access to specialist expertise and costly cutting-edge capital equipment. Catapults help with these factors by providing a centre of expertise and shared access to equipment at relatively low cost.

7.21 Catapults are an idea whose time has come. During the course of my review, I have been repeatedly exposed to positive sentiments from companies working with the Catapults. I have also consistently heard three specific views about the future of Catapults.

7.22 The first is that we need to give this innovation enough time to become properly established: we should not pull this plant up by the roots to see if it is growing fast enough. Proper evaluation of the Catapults will take time because the innovation cycle is often long, relationships take time to get established, and the Catapults have only been operating for a couple of years. Robust quantitative evaluation of the Catapults programme will always be difficult because of the complexity of identifying what causes what in the very complex and open system of industrial innovation.

7.23 The second view, which is entirely consistent with the first, is that we should not increase the number of Catapult centres without at least proportionately increasing their overall level of funding. This is an activity where ‘jam spreading’ is likely to result in poor results. Success requires critical mass, both for investment in expensive and cutting edge facilities, and in the institutional time required to build strong links between companies and researchers.

7.24 The third view, again consistent with the first two, is that Catapults should move consistently towards a model of deep engagement between businesses and the academic community. Shared access to expensive capital equipment is useful. But the real promise of Catapults is their ability to bring researchers and business people together, so that we can realise more value from the strengths of both.

Recommendation V: The Catapult centres are a promising initiative, and they should be protected and properly evaluated when they have had a chance to demonstrate their value. They should focus on deepening the links they create between the scientific research community and businesses, especially small and medium sized businesses. We should not increase their numbers at this time because the investments required to excel in technology are large: we must not ‘spread the jam’ thinly.

¹⁷Hermann Hauser, The current and future role of technology and innovation centres in the UK, 2010

¹⁸Cell Therapy Catapult, Connected Digital Economy Catapult, Future Cities Catapult, High Value Manufacturing Catapult, Offshore Renewable Energy Catapult, Satellite Applications Catapult, Transport Systems Catapult, see <https://www.catapult.org.uk>

¹⁹Advanced Forming Research Centre, Advanced Manufacturing Research Centre, Centre for Process Innovation, Manufacturing Technology Centre, National Composites Centre, Nuclear AMRC, Warwick Manufacturing Group, see <https://hvm.catapult.org.uk>

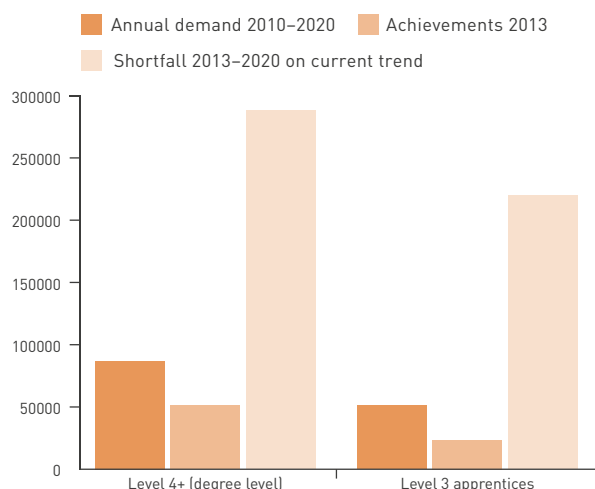


8

“WE HAVE A SKILLS CHALLENGE IN GERMANY. YOU HAVE A SKILLS CRISIS IN THE UK.”²⁰

- 8.1** The single biggest strategic challenge for advanced manufacturing in the UK is the availability of skilled people, at both technician (Advanced Apprentice) and degree level. As one German colleague said to me in the early stages of my review, “We have a skills challenge in Germany. You have a skills crisis in the UK.” The rhetorical point is well made, but in fact ‘crisis’ is not the right word for our situation. A crisis is an acute issue that comes naturally to a head and forces a response. Instead **we have a profound long-term problem, one that is already a serious barrier to investment and growth, and which will get progressively worse.** We must tackle it urgently, at scale, and in a sustained way. This means taking different actions in order to have an impact in the short, medium and longer term.
- 8.2** People in the UK often look admiringly at the German system of technical and vocational education, but we cannot simply imitate them. Not only is their system the product of a particular historical, social and cultural context, if we tried to copy them we would simply never catch up: they are already moving ahead. Instead we should recognise the core strengths of the German system, and we should strive to create them in our own context:
- **High expectations of every young person**, not just in terms of achieving the basics at school, but in terms of their final qualifications and readiness for highly skilled work. Every young person in Germany is expected to achieve either a degree or a good quality apprenticeship. As a nation they understand they will not succeed economically or socially except on the basis of high skills and high productivity.
 - Genuine **parity of esteem between the ‘academic’ and the ‘vocational’ routes**, and flexibility between them. This only happens when education systems, institutions and qualifications are genuinely of equal quality and value to the learners. This cannot be legislated for, but it can be promoted or damaged by what politicians do and say, and what they are seen to value.
 - High levels of **employer ownership of both the standards and the delivery of education and training.** This implies the civil service standing back significantly and accepting some risks. But the alternative is a waste of public funds on low-quality and irrelevant courses that do not meet the needs of either learners or employers.
- 8.3** In the UK we are simply not educating enough young people in the right skills to an adequate level for advanced manufacturing and its supply chain. This is the case across all sectors that depend on science, technology, engineering and mathematics (STEM) skills. Whether we look at vacancy rates, employer difficulties with recruitment, or wage premiums for employees, the overall message is the same^{21,22,23}. Roughly speaking, we need to increase the supply of young people with the relevant degree qualifications by around 50% from its current level, and double the number of high-quality technical apprentices qualifying annually. Taking engineering as an example, **on current trends we will face a shortfall of over a quarter of a million degree level engineers, and more than 200,000 engineering apprenticeships, by 2020.**

Figure 8.A: demand and supply of skills for engineering, 2013-2020



Source: Engineering UK 2014 Report

8.4 We must take action now to address the short, medium and longer-term skills challenges.

It is not that we face a crisis this year. The point is that action on skills takes a long time to feed through into an increased supply of productive workers. For example, an advanced apprenticeship (level 3, the equivalent of A-levels) takes three years to complete. A degree often takes four years, plus another for a master's degree. But in both cases it takes at least a year or two after qualification for the new recruit to become a fully productive employee. So if for example we increase the flow of young people onto manufacturing related degrees this year, it will be six or seven years before they are really contributing to the success of UK based companies. If we wait that long we will certainly see major investment decisions that are not in our national economic interest. So we need to do five things:

- Retain more of the many highly skilled non-EU students graduating from UK universities with manufacturing related degrees
- Get more of the well-qualified A-level students in the UK onto engineering and other manufacturing related degree courses
- Move rapidly and decisively to full employer ownership of apprenticeships

- Retrain more workers from other sectors for jobs in advanced manufacturing
- Equip many more young people with the literacy and numeracy skills they need to start an advanced apprenticeship.

8.5 The pipeline of skilled young people is improving, with one marked exception

One of the real successes of the last ten years has been a big improvement in the number of young people achieving science qualifications at school. **GCSE achievement in single sciences has been transformed:** ten years ago in 2004 just over 50,000 young people were entered for each of single science physics, chemistry and biology. In 2013, over 160,000 young people were entered for each of single science physics, chemistry and biology, and pass rates have improved despite this growth.

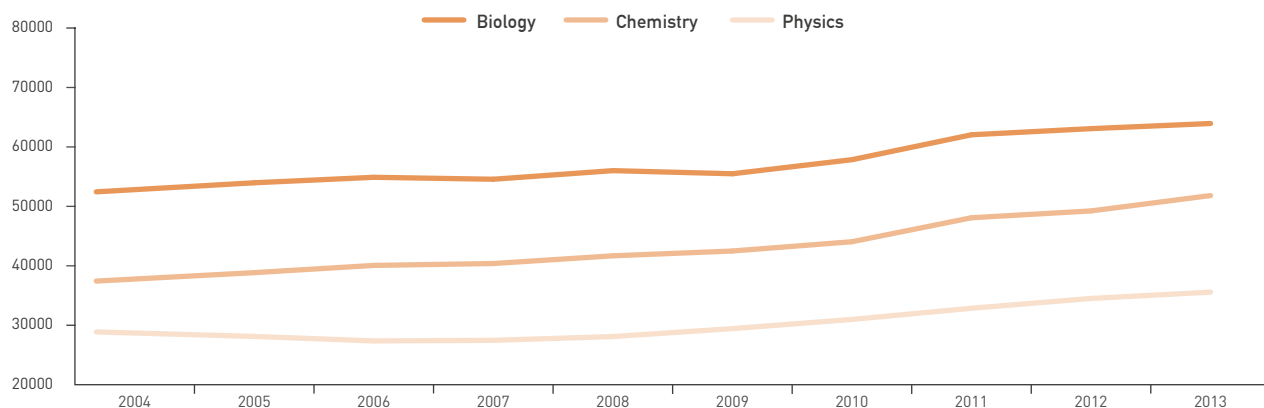
²⁰This section draws extensively on the evidence paper "A supply of skilled labour" provided by EEF for the Wright Review. It is published alongside this report at www.thewrightreport.net

²¹Source: Jobs and Growth, Royal Academy of Engineering econometrics of engineering skills project, Final Report September 2012, executive summary

²²Government Office for Science 2013, Foresight Report: The Future of Manufacturing, Evidence Paper 36

²³Engineering UK 2014 Report, table 15.3

Figure 8.B: A level entries for each of physics, chemistry and biology have grown by more than 20% over the past decade



Source: Joint Council for Qualifications (JCQ)

8.6 A-level entries in physics, chemistry and biology have also increased significantly. Between 2004 and 2013 A-level entries increased by twelve thousand for biology; fifteen thousand for chemistry; and seven thousand for physics. It will need careful attention to ensure that the large GCSE science gains are translated into further rises in A-level entries. In particular we need many more girls taking up physics A-level (see box, right). However, the overall message is that **many more young people in the UK are now well qualified at the age of 18 to go on to higher education suitable for advanced manufacturing: this is an opportunity we must seize.**

8.7 Whilst the number of pupils with science GCSEs and A-levels has increased significantly, it is also true that in 2013 four out of ten 16 year olds left secondary school without securing Level 2 skills: at least five GCSEs at grade C or better, including both maths and English. This is generally considered the baseline for secure employability, and it is the minimum requirement for starting an Advanced Apprenticeship. Even worse, **in 2013 fully one in every three (36%) young people reached the age of 19 without achieving Level 2 skills including the equivalent of at least GCSE grade C in both maths and English**²⁴. So we need continued focus in both schools and the further education system on securing these foundation skills for all young people.

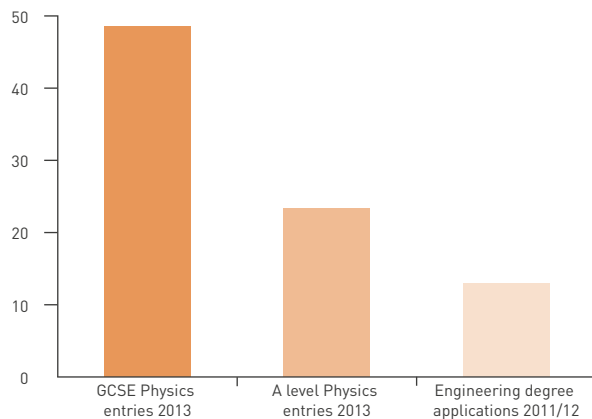
Far too few women choose to study science and engineering at advanced and higher level

We are nowhere near tackling the problem of low numbers of women entering the manufacturing and engineering professions. Girls outperform boys in all three subjects of GCSE single science physics, chemistry and biology. In addition, over the last ten years girls' share of GCSE entries has slowly increased so they are now very near parity with boys in each case.

The women who go on to take A-level science again outperform their male peers in all three of physics, chemistry and biology. Yet the share of entries by women in each subject has actually fallen over the period 2004-2013. Physics – which is critical to many advanced manufacturing roles – is the stand-out cause for concern. Fewer than one in four A-level physics entries were from women in 2013.

Just one in eight applications to engineering degrees were from women in 2011/12, and a lower proportion of female than make engineering graduates then enter engineering jobs. So at each point of transition, from school to sixth-form and college, and from there to university and work, we are losing many thousands of potential female engineers.

Figure 8.C: From parity at GCSE, fewer than one in four physics A-level entries are from women, and just one in eight applications to engineering degrees



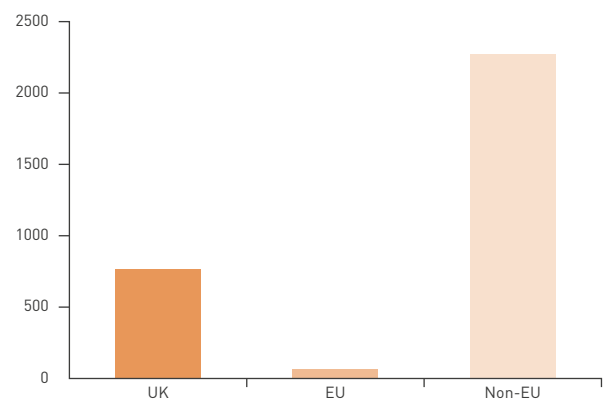
Source: JCQ / UCAS

We need decisive action in the short and longer term to increase the number of graduates entering the UK manufacturing workforce

8.8 Despite this improving pipeline of suitably skilled young people, the number of UK engineering graduates has increased very little. Engineering is by no means the only relevant degree level subject, but it is crucial and an area of particular shortage. Applications from UK based students for undergraduate engineering degrees increased by 39% over the nine years from 2003/4 to 2011/12, but acceptances only increased by 23% over the same period. So a lower proportion of a larger pool of applicants are now successful in securing places. The trend in first degree completion by UK engineering students is also very disappointing. In 2003/04 there were 12,915 engineering first degrees awarded to UK students by UK universities, and by 2011/12 this number had grown just 6% to 13,680.

8.9 Some of this can be explained by the inevitable time lags between young people achieving school qualifications, applying to university, and completing their degrees. But this is not the whole story: there is also an important issue in terms of the supply of engineering places by universities. While the number of engineering degrees awarded to UK domiciled students increased by fewer than 800 between 2003/04 and 2011/12, the total number of engineering first degrees awarded by UK universities increased by 3,100 over the same period. The universities actually increased their total supply quite substantially, **but non-EU nationals accounted for fully three quarters of the increase in engineering degrees awarded by UK universities over this period.**

Figure 8.D: Increase in engineering first degrees awarded by UK universities 2003/04 – 2011/12, by domicile of student



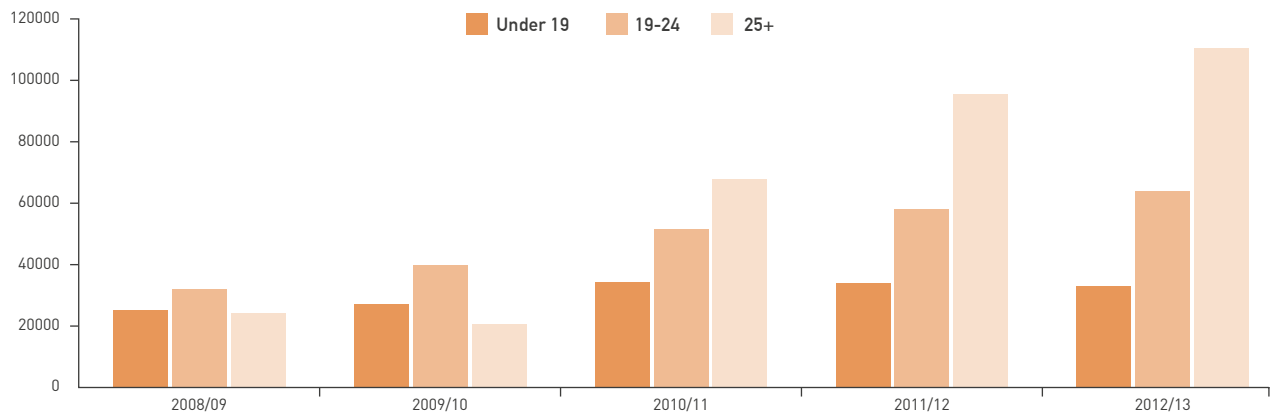
Source: Engineering UK 2014 'The state of engineering', tables 11.31-33, based on HESA bespoke data request

²⁴<https://www.gov.uk/government/publications/level-2-and-3-attainment-by-young-people-aged-19-in-2013>

²⁵Source: Engineering UK report 2014, figure 7.3, from Joint Council for Qualifications data

²⁶ibid

Figure 8.E: number of postgraduate degrees (excluding doctorates) achieved in engineering at UK universities, by domicile of student



Source: Engineering UK 2014 'The state of engineering', tables 11.31-33, based on HESA bespoke data request

8.10 The situation is even more striking in relation to postgraduate degrees at master's level – an important step in the most advanced engineering careers. The growth in non-EU national students at this level of study is simply staggering. The increase in UK domiciled students achieving higher engineering degrees was 1,200 over the period. The corresponding figure for non-EU nationals was just over 6,000. Non-EU students at this level of study now outnumber UK students by well over two to one and comprise almost two thirds of all such students in UK universities.

8.11 It is to be celebrated and welcomed that our universities are so attractive to foreign students. They enrich our academic life, represent an important revenue stream for UK universities, and their studying here strengthens our international relationships. However, this scale of change represents a really significant shift in the role of our higher education institutions. Crucially, the vast majority of these non-EU students cannot stay in the UK to work in advanced manufacturing firms here. It is technically possible for employers to recruit them. However:

- Non-EEA workers can only come to the UK with a job offer (under Tier 2), unless they meet very stringent criteria that allow them to come the UK under Tier 1 (Exceptional Talent, Investors).
- Access to information through the UK Visas and Immigration service is difficult to navigate, and employers often experience delays on responses to requests for information.
- Salary thresholds set by the Home Office for different job types can be far higher than those companies would pay in the domestic labour market.

In practice, all but the largest employers find this system too difficult and burdensome to use. This is reflected in the fact that the Tier 2 limit is around 50% undersubscribed despite significant skills gaps in the very sectors that are recognised as shortage areas by the Migration Advisory Committee²⁷.

8.12 So we are using our best educators, in our elite universities, to train some of the finest young minds in the world, and we then send them home to work for our competitors. We send them away despite the fact that many want to work in the UK, in roles where there are serious skills shortages, in jobs that would generate growth and tax revenues for the UK. This is madness. Right now in the short-term we need to address this issue, so that manufacturers can access more of the high quality non-EU talent currently being trained in large numbers by UK universities.

8.13 In the longer term we need to start a serious national conversation about how to ensure more UK university places go to UK domiciled students. As the supply of well qualified A-level students flows through into applications, we should be especially vigilant that acceptance rates do not continue to fall, shutting out suitable UK applicants. This is a major challenge to both the University sector and to the government which is responsible for a significant part of its funding.

Recommendation VI: We must dramatically expand the number of manufacturing related degree places, including for engineering, that are taken up by UK domiciled students. However, our higher-level skills needs are too urgent for this to be sufficient. Within the total immigration numbers we must make it easier for more highly skilled non-EU students graduating from our top universities with manufacturing related degrees to stay and work here. We also need to consider ways to incentivise skilled older workers to delay retirement.

Moving rapidly and decisively to full employer ownership of apprenticeships.

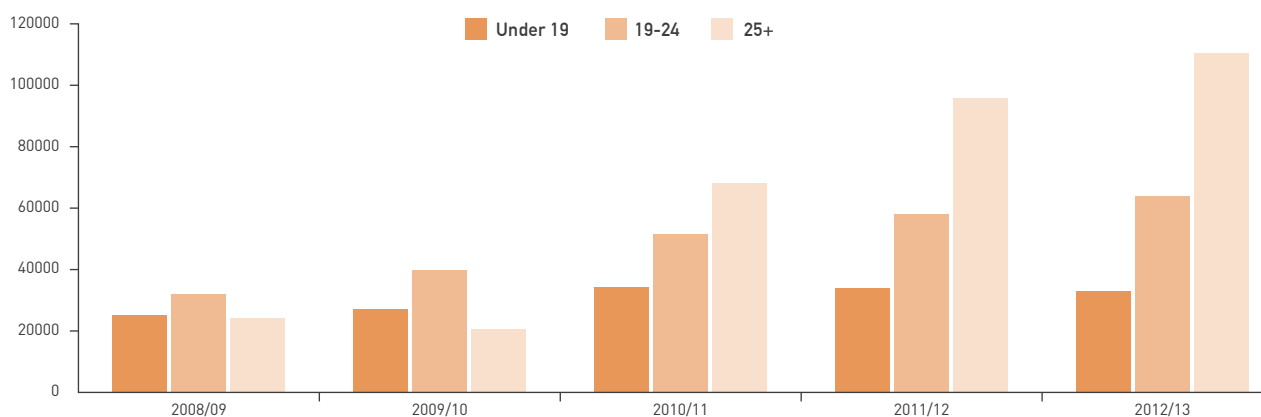
8.14 Apprenticeships are increasingly and rightly recognised as the gold standard vocational qualification. There has been a lot of focus on apprenticeship policy in recent years, including Doug Richard’s 2012 review for the government²⁸. As he says, we have to preserve the quality, value and meaning of apprenticeships at the same time as expanding their number dramatically. I agree with his conclusions and particularly with his focus on the

need for full employer ownership of apprenticeships. The government should fully implement his recommendations.

8.15 Further important work in this area has been done by Chris Husbands through his 2013 apprenticeships review for the Labour Party²⁹. As he shows, apprenticeship numbers have grown significantly over recent years, but the bulk of the growth has not been in the kind of high-quality apprenticeships for young people that advanced manufacturing and our wider economy needs. For example, the majority of the growth has been in apprenticeships for the over 25s, where starts increased by more than 80,000 per year over the five years to 2012/13, compared to just 40,000 for the under 25s.

8.16 Many of these older apprentices are likely to be in jobs already, and some are primarily receiving accreditation for skills they already have. Similarly, the majority of growth has been in Intermediate level apprenticeships. These programmes – the equivalent of five GCSEs – may be appropriate for younger people who have not achieved this level already. However, our real objective must be to achieve significant growth in Advanced apprenticeships, which are the level at which almost all advanced manufacturing employers want to recruit.

Figure 8.F: Apprenticeship starts by age of learner, 2008/09 to 2012/13



Source: Statistical First Release 23, Further Education & Skills: Learner Participation, Outcomes and Level of Highest Qualification Held, Table 6.1

²⁷Skilled, Shortage, Sensible: Migration Advisory Committee report 2013

²⁸Doug Richard, The Richard Review of Apprenticeships, final report 2012

8.17 There is no true apprenticeship without a job. So the number of apprentices depends on the number of young people who want to take them up and the number of employers who are prepared to offer apprenticeship contracts. Apprenticeships as a whole are already oversubscribed, and they have an increasingly good reputation among young people and their parents who rightly see them as a way to secure good skilled employment. There will always be commercial providers for off-the-job training. So the key challenge is to increase the number apprenticeship places offered by employers. Two of the most important ways to do this are:

- Employers should be fully in control of the content and professional standards of apprenticeships in their sector, through their sector representative bodies, and
- Employers should be fully in control of public apprenticeship funding: it should be routed directly through the individual employer, who should use the money to buy any necessary external training for the apprentice.

8.18 Employers see apprentices fundamentally as a way of securing good, skilled, loyal employees. But it is much easier for large companies to offer apprenticeships than smaller companies in the supply chain. Firstly there are inevitable administrative time costs to be borne, and in a small business without an HR department this will often fall on a very senior member of staff. Secondly a relatively little-known small business is likely to attract a smaller and weaker field of applicants than a major well known company. Thirdly, when a business takes on just one to two apprentices then the impact of that person dropping out, or leaving for a larger firm once their training is complete, is relatively large. Large companies are not going to over-train large numbers of apprentices for their supply chain, but many would be willing to provide training for apprentices whose contracts were with other firms.

8.19 Fundamentally this is a problem of coordination: the whole sector would benefit from a greater supply of apprentices, but individual companies cannot take on too much cost and risk. They won't want to supply places if they think other employers will take a 'free ride' and hire all their apprentices once they qualify. What is needed is an employer led organisation performing a coordinating role, so that all the businesses in a sector can have confidence that everyone else is playing their part too. As the Husbands review says:

“In return for more control over skills funding and standards, employers should be asked to develop plans to increase the number of high quality apprenticeships in their sectors, areas and supply chains.”

8.20 In my view the most promising existing national employer-led institutions to play this role are the industry sector councils such as the Automotive Council, which are building capacity and credibility within their sectors. The corresponding local and regional institutions with employer ownership are the Local Enterprise Partnerships. They must build the ability to work with local employers and skills providers to facilitate the local supply of apprenticeship places. We should work towards these two institutions, at national and local level, taking increasing control and responsibility for expanding apprenticeship provision.

Recommendation VII: We must double the number of engineering apprentices qualifying at advanced level – from 23,500 to 50,000 each year – by the end of the next Parliament, with corresponding increases in other manufacturing related areas. We should fully implement the Richard Review of Apprenticeships. Employers should have full ownership of the standards and public funding for apprenticeships, and the sector councils alongside the Local Enterprise Partnerships should take on responsibilities for expanding supply. In addition we must continue to grow the pipeline of young people – especially women – who want to study for manufacturing related qualifications.



9

GETTING FUNDING FLOWING TO MANUFACTURING BUSINESS AGAIN³⁰

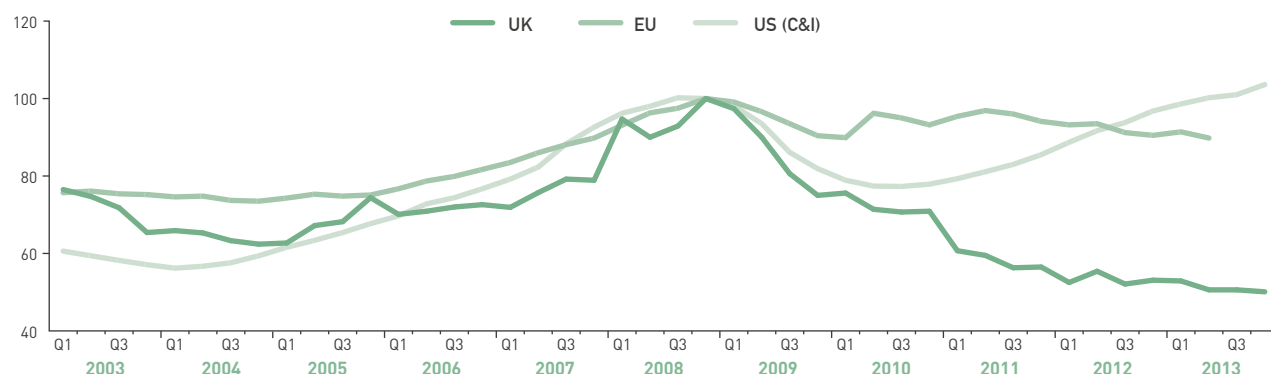
- 9.1 All investment requires funding, and all firms require working capital.** While rapidly expanding firms have the most obvious funding needs, companies at all phases of growth and development have funding requirements. Start-ups need seed capital and short-term facilities to help them manage cash-flow. Medium sized companies often need capital for growth, exports, new equipment and R&D. Large companies and inward investors need to finance major investments, new product lines and acquisitions. Manufacturing is also particularly intensive in its use of working capital to buy materials and components, and to run manufacturing processes, prior to receiving sales revenue.
- 9.2** Different funding sources are appropriate for different purposes. Very new businesses that are a long way from generating revenue are likely to rely on equity. Companies with good profitability and positive cash-flow may be able to use retained earnings to meet their needs. Very large companies can access wholesale funding markets by issuing bonds as well as calling on banks. However, **for most small to medium sized companies, conventional bank finance is critical.** The availability of credit, its cost, and conditions such as collateral requirements are all vitally important to SMEs.
- 9.3** The availability of funding affects both individual companies and the economy as a whole. The Office for Budget Responsibility identifies a particular problem with low levels of business investment in the UK, both over the long term and particularly in the current economic recovery^{31,32}. **If we want a rebalanced and sustainable economy, it will be important to get funding to flow more effectively to productive investment opportunities in the advanced manufacturing sector.**
- The recent financial crash has hit funding for UK manufacturers hard**
- 9.4** There are good reasons for the recent tight credit conditions. The financial sector worldwide experienced a profound crisis in the crash of 2008 and the effects are still constraining credit markets. Many large lending institutions have been taken into state ownership or supported with substantial public funds, both in the UK and in other countries. Many have been required to reduce their liabilities and increase their capital in order to reduce their level of leverage and risk. This has had serious knock-on effects for manufacturing and other companies that need access to credit.

³⁰This section draws extensively on the evidence paper "Finance for Development and Growth" provided by ADS for the Wright Review. It is published alongside this report at www.wrightreview.net

³¹Office for Budget Responsibility (March 2014): Economic and fiscal outlook

³²Office for Budget Responsibility (December 2013): Economic and fiscal outlook

Figure 9.A: Net lending to manufacturing in the UK has fallen further and faster than in the EU, and has not recovered.



Source: Bank of England, European Central Bank, Federal Reserve

Note: The US data does not disaggregate commercial and industrial lending, and was also supported by the Fed's significant Quantitative Easing programme.

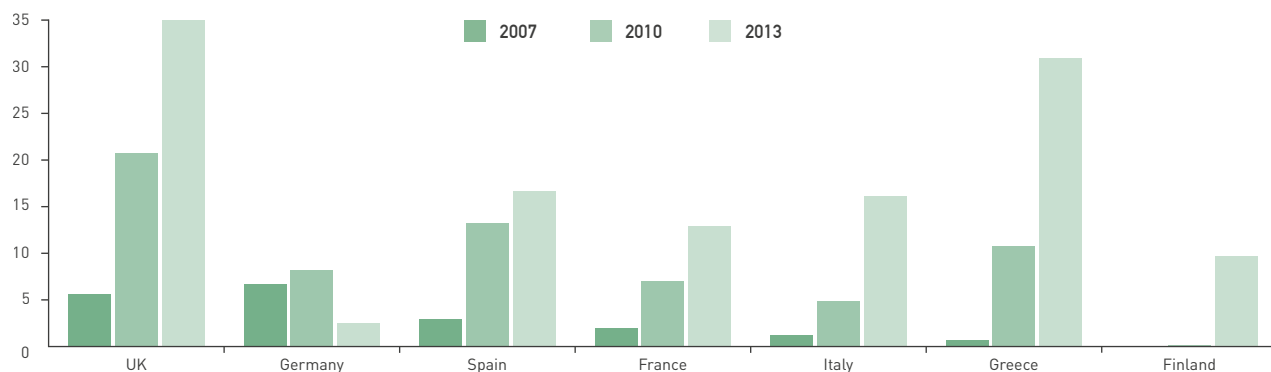
9.5 The global effects can be seen in the chart below. **Credit conditions in the UK have been particularly badly affected compared to some of our major competitors.** Net lending to manufacturing in the UK at the end of 2013 was almost 50% below its pre-recession peak, a far greater fall and weaker recovery than in the Eurozone or US³³. Note that the measures in this chart do not include bond issuance by large companies, so they give more weight relatively to SMEs, which do not access that lending market.

9.6 Just as banks have wanted to reduce their exposure to borrowers in recent years, so borrowers have sought to reduce their levels of indebtedness. **The fall in net lending is not purely a result of constrained supply of credit.** However, low levels of lending

do not simply reflect a lack of demand by would-be borrowers. This can be seen by looking at the success rate of firms that applied for loans. The data presented here are for SMEs in all sectors, but it is very unlikely that the situation is better in the manufacturing sector.

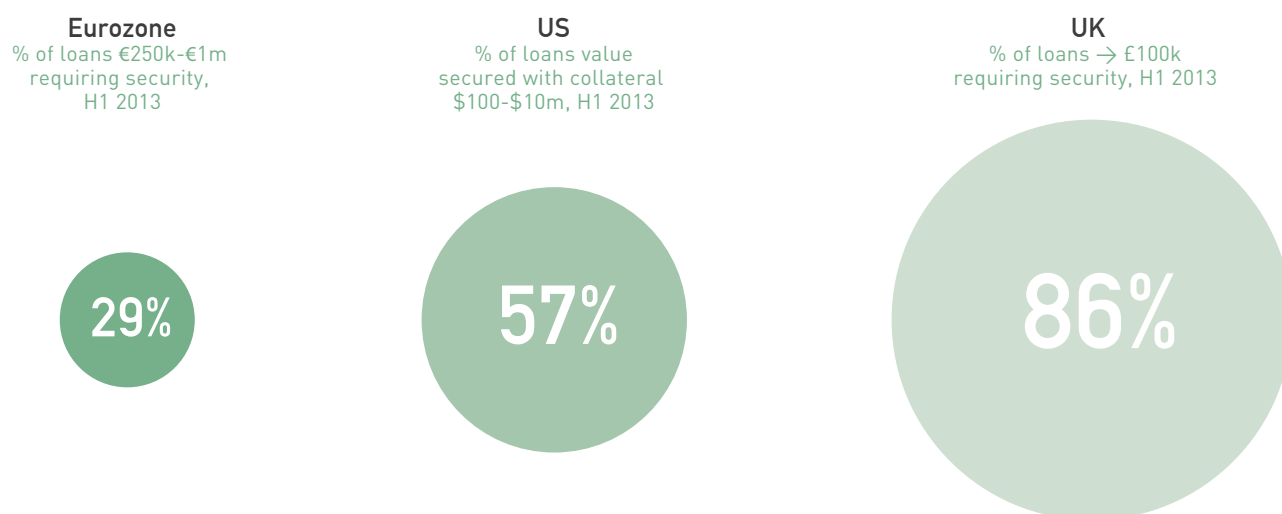
9.7 Rejection rates for loan applications increased across Europe from 2007 to 2010 to 2013. However, **the increase in rejection rates has been disproportionately high for UK firms.** There is also evidence, set out in the supporting paper for this Review by ADS, of 'discouraged demand' where companies that would want to borrow are put off from applying. So the already high rejection rates may well understate the true difficulty of manufacturing firms successfully obtaining credit.

Figure 9.B: loan rejection rates in selected countries before and after the financial crisis (%)



Source: Eurostat (2007 & 2010); SME Finance Monitor & Survey on the access to finance of SMEs in the euro area (2013)

Figure 9.C: UK banks are almost three times more likely to require collateral as Eurozone lenders



Source: ADS in supporting paper to WR, originally from EU Commission, Federal Reserve and SME Finance Monitor

It is small and medium sized businesses that face the biggest funding challenges

9.8 Firms are not just facing rejection of loan applications and high borrowing costs. Too many UK firms are also facing terms and conditions that make borrowing impossible or unacceptable, regardless of the underlying profitability of their business. A particular problem is the common requirement for collateral, which small firms in particular may not be able to provide, or only at high personal risk to the business owners. UK banks appear to impose collateral requirements much more often than Eurozone banks on similar sized loans.

9.9 The main problems with credit availability are for small and medium sized businesses. Smaller firms can be disadvantaged by credit scoring models that assume they are riskier, younger firms will have a shorter track record, and innovative firms may find their business is not well understood by lenders. Meanwhile from the lenders’ perspective the costs of due diligence are relatively high for smaller transactions. The end result is a well-recognised shortfall in funding for small to medium sized businesses in the UK, a problem addressed for example in the Rowlands Review of 2009³⁴ and revisited recently by Andrew Haldane, Chief Economist at the Bank of England³⁵.

Improving the flow of funding: what can government do?

9.10 There are broadly three kinds of thing that government can do to improve the flow of funding to businesses. The first is to create a stable economic environment with low interest rates, where banks and investors feel confident to lend and invest. The second is to try and shift the mainstream banking sector so it more effectively meets the needs of borrowers. The third is to introduce new government-funded or backed schemes to try and meet needs that the market alone will not serve.

9.11 Banking in the UK is a relatively concentrated market dominated by four large ‘high street’ banks: Lloyds, The Royal Bank of Scotland, Barclays and HSBC. These four banks currently account for around 85% of the SME lending market in the UK. It might be a good thing if this market was more diversified. However, **given the current position, any major changes in the lending market in the medium term will have to come from changes in the approach of the existing banks.** As the ADS paper puts it:

“The Vickers Commission estimated that challenger banks increase their market share on average by 0.34 percentage points each year. Assuming a single new start-up bank is able to increase their market share at the same rate of 0.34 percentage points of the market per annum, it would take approximately 30 years for

³³Source: Bank of England, European Central Bank and Federal Reserve. Note: The US data does not disaggregate commercial and industrial lending, and was also supported by the Fed’s significant Quantitative Easing programme.

³⁴Rowlands C, The Provision of Growth Capital to UK Small and Medium Sized Enterprises, TSO 2009

³⁵<http://www.telegraph.co.uk/finance/economics/10903679/The-UK-needs-a-credit-register-to-close-its-Macmillan-gap.html>

a single bank to gain 10% market share from the top four banks.”

9.12 What kind of change would we want to see in current banking practice? A comparison of how lending decisions are taken in the UK, Germany and the US is instructive. The key difference is that UK lending decisions are driven overwhelmingly by models based on quantified financial inputs, and often generate collateral requirements to hedge any remaining risk of non-payment. In both the US and especially Germany, other qualitative factors such as information about the character of the business and borrower are more often taken into account. The key point about such relationship banking is not that it leads to ‘softer’ decisions and more approvals of riskier applications, but that it leads to better decisions based on more of the relevant information.

9.13 It will be hard to shift the banking sector towards a new equilibrium in which its lending is more informed by relationships and a better understanding of manufacturing business. Greater competition from challenger banks and from well-run public funding schemes should eventually drive large banks to seek lending opportunities more imaginatively. However, as one respondent to the Review put it:

“The onus for change falls on the banking industry itself which needs to rediscover an appetite for risk and put more trust in the judgment of relationship directors.”

Recommendation VIII: Businesses need to exercise creativity in seeking funding, and demonstrate acumen in the way they engage with potential funders. Banks need to rebuild their balance sheets whilst taking the opportunities of funding the growing advanced manufacturing sector.

Public schemes to address ‘funding gaps’ and a ‘British Business Bank’

9.14 On the one hand there are good reasons for government to play a direct role in addressing ‘funding gaps’. On the other hand there are also good reasons for government and firms to be very nervous about this kind of activity. Government is rightly worried about its ability to administer funding schemes effectively and efficiently. Meanwhile firms don’t want to be beholden to a government lifeline that comes with unpredictable consequences and burdensome due diligence and audit requirements.

9.15 **Public funding schemes announced with great fanfare can also easily bog down and lose their impact.** Whilst banks worry about the impact of bad loans on their profits and balance sheet, civil servant and politicians worry about being accused of misuse of public funds if their schemes sustain losses. This kind of worry can cripple the administrative process and lead to risk-averse decisions that are arrived at much more slowly than the private sector.

9.16 The Regional Growth Fund is one high profile example of such a scheme. This major initiative was set up in 2010 with a headline fund of £3.2bn to allocate to the creation of jobs and growth. It has some good features: the bidding process is open, competitive and cross-sectoral. **By the end of 2013, £2.6bn of bids to the Regional Growth Fund had been agreed and funds allocated, yet only £492 million had actually reached projects.** The balance was still sitting with central government or intermediaries.

Figure 9.D: Only one-fifth of Regional Growth Fund awards had been delivered to companies as of December 2013



Source: National Audit Office, Progress Report on the Regional Growth Fund, February 2014

9.17 **It is astonishing that in a major initiative of this kind, the money is being held up for so long even after applications have been deemed successful.** This simply will not meet the needs of private sector firms operating in a competitive environment. Two years is far too long for a company to wait before receiving funding that is required to meet a specific need. In that time it is likely that its circumstances and plans will have changed. Certainly, this kind of delay makes it hard for companies to plan investment on the basis of receiving the funds. In the private sector lending market, when a firm is successful

in its application, the funds flow without delay.

- 9.18** The Regional Growth Fund is a major public funding initiative, but it is only one of a very large number of regional, national and international schemes funded or facilitated by government. Many are seeking to meet specifically defined needs, whilst others overlap significantly in their aims and target market. The sheer number makes an evaluation here impossible. What is absolutely clear is that no small to medium sized enterprise can possibly navigate such a complex landscape effectively. **There needs to be something (beyond a website) that helps companies access the right kind of help in an efficient manner.**

The British Business Bank

- 9.19** All the main political parties have said they back the idea of a new public institution that is focused on lending for business. This is sometimes described as a British Investment Bank or a British Business Bank. However, there are very different models being proposed, and there are real dangers in creating any such institution. The key question is what should be the purpose of this new Bank, how and on what basis would it be run, and how would it help the advanced manufacturing sector and its supply chain?
- 9.20** We should not return to the world of government providing large amounts of long-term growth and working capital to large enterprises. This is a job for mainstream banks and capital markets. However, neither should we simply hand public funds and guarantees, through a new institution, to the mainstream banks to distribute using their existing models. This won't lead to meaningful change.
- 9.21** The challenge is to establish a British Business Bank as a more efficient delivery mechanism for all the public funding schemes available to business. What would advanced manufacturers and in particular SMEs in the supply chain want from this new institution? The answer in brief is:
- The opportunity to access meaningful amounts of funding that is not available elsewhere
 - A process of application that is simple and not burdensome, which avoids the need to navigate numerous different public schemes
 - Decisions that are reached quickly, and in the case of positive decisions funds that flow quickly
 - Stability and eventually familiarity with the institution.

- 9.22** **To be meaningfully different and have a significant impact, a British Business Bank needs to become a real institution making its own decisions, taking on its own risks, and with its own distribution channels.** The Business Bank should not simply use the existing banks to take lending decisions and distribute its funds, but more work needs to be done on how the Business Bank will access and interact with its customers.

- 9.23** It must be efficient and competitive from the perspective of the borrowers. Its terms and conditions must of course be competitive with the mainstream banks (although no one should think they will be 'softer'). It must be able to meet the needs of businesses that want to export. It should have sector specialist capability, including in relation to the advanced manufacturing sectors and its supply chain. This implies one national Business Bank, with regional operations to develop close relationships with local businesses and with Local Enterprise Partnerships.

- 9.24** To improve simplicity for borrowers, the Business Bank should be the single 'front door' for all public funding schemes. It should be the place businesses know they should go to, and which government always uses to channel new funds. It should be tasked to reduce in number, simplify and improve the administrative efficiency of public funding schemes. It should be strongly focused on speeding up the process from application to receipt of funds. It could also help companies with their applications and preparation for due diligence, which would be separate from lending decisions within the bank.

- 9.25** To be sustainable a British Business Bank must be able to stand on its own two feet, so it is not vulnerable to being cut for fiscal reasons. So it should be profitable: it should make an acceptable return on its public capital and in the medium term impose no running costs to taxpayers. It should also be able to raise capital on the open market to leverage its public funds. This combination is the only way of ensuring it is sustainable in the long term.

Recommendation IX: The British Business Bank should act as the delivery mechanism for all the public funding schemes available to business. It should provide access to meaningful amounts of new funding, through an efficient and timely decision-making process. It should be the single 'front door' for all public funding schemes whilst simplifying and reducing them in number.

10

IMPROVING AND STABILISING THE GOVERNANCE OF INDUSTRIAL AND INNOVATION POLICY

- 10.1** As Sir George Cox noted in his recent review, **“Government is, by its nature, short term. Elected for a maximum of five years, it would be unnatural if an overriding concern did not soon focus on getting re-elected.”**³⁶ This is not a derisive or cynical comment about politicians, it is simply recognising the reality of the electoral cycle. Similarly, individual politicians will always be concerned with achieving personal success and recognition. In the case of ministers and secretaries of state, this usually means in relation to their own brief and department, with a time frame even shorter than a five year Parliament.
- 10.2** **Yet throughout this report the challenges I have highlighted are generally long-term and cross-cutting.** They require concerted action over many years, for example to grow bank lending to SMEs or to increase spending on innovation. Their pay-off may not be apparent for a long time, for example through the increased productivity of better educated young people, or decreased costs from better transport infrastructure that took years to build. Many require coordinated action across government departments, for example balancing the requirements for immigration control with access to skills, or taking the right approach to energy regulation and taxation.
- 10.3** We must try and find new ways of squaring this circle between the inherently short term and parochial focus of government and politics, and the long term needs of advanced manufacturing and our wider economy. In this final section of my report I discuss briefly three issues with this objective:
- The need for better cross-government coordination
 - The importance of institutional stability, especially in relation to employer bodies involved with government
 - The potential value of periodic strategic policy reviews with a long term focus, especially in relation to innovation and industrial policy.
- Improving cross-government coordination**
- 10.4** **It is not hard to see current examples of a lack of joined-up working within government that are having a seriously negative impact on advanced manufacturing.** For example: the Home Office approach to visas and immigration; the DECC approach to energy costs and regulation; DfE/BIS conflict over vocational qualifications and the further education sector. In the end, there may be legitimate reasons why what is good for manufacturing is considered inappropriate on balance for the country as a whole. I do not pretend to have the structural proposals that would force the right kind of coordination. However, the objective should be debates where:
- The interests of advanced manufacturing and industry more widely are properly represented
 - The issues are worked through openly, with clear distinctions between what is factual, speculative and political

- The consequences of policy decisions in other areas are made clear for the manufacturing industry, and
- Critical issues for manufacturing cannot simply be avoided or pushed into the long grass because these discussions and their consequences are awkward.

Increasing institutional stability locally and nationally

10.5 There is a damaging tendency in British politics for incoming governments to rip up the work of their predecessors, only to replace it with something that looks very like the original. In the meantime huge amounts of energy and time are lost in reorganisation. This has historically applied in the case of government/industry partnership bodies such as Regional Development Agencies and Sector Skills Councils. Contrast this with, for example, the German Chambers of Commerce, which have great power, standing and stability. As a result they are highly effective in relation to strategic challenges such as setting professional and industry standards, and coordinating training.

10.6 Industry in the UK needs a way of coordinating its work with government, not just as an advocate with a shopping list of requests, but as a partner which shares responsibility for solutions. Conversely government needs a counter-party: someone to talk to and work with at sector level beyond the important independent representative organisations. This is true at both national and local level.

10.7 At the national level we have now established Industry Sector Councils, and at the local and regional level Local Enterprise Partnerships. These are now the key forums where business and government work together, and it is welcome that the Labour Party has indicated it will maintain the LEPs if it forms a government. We need to make both forums work more effectively, and the national and local levels need to talk to each other and work increasingly closely together. **Evolution – not revolution – and devolution should be the watchwords for these national and local institutions.** We should be seeking to develop the existing bodies and devolve as much power, funding and responsibility to them as possible. Three broad principles driving our approach should be:

- Business led partnership organisations should take progressively more ownership and responsibility for key policy issues in their area, both nationally and locally
- Government should take more risks to achieve better employer ownership and engagement
- We should prize stability so that the organisations develop familiarity and credibility within their sectors, and their personnel and operations have time to become effective

10.8 I am not advocating a uniform approach: government should set a clear direction of travel and then support the existing business led organisations to develop as far as they can. They should not take on responsibilities for which they are not ready. But we have to move away from the civil service mind-set of ‘not until we are sure’ to the business mind-set of ‘when we think we can make it work’.

Stabilising innovation and industrial policy with strategic, long-term reviews

10.9 In his recent review of infrastructure planning³⁷, Sir John Armitt proposed an important innovation to improve the UK’s lamentable UK record on major infrastructure development. His central recommendation – which I fully support – was for the creation of:

“... a new National Infrastructure Commission with statutory independence. Each decade, this body would undertake an evidence-based assessment of the UK’s infrastructure needs over a 25-30 year horizon.”

This Review has not addressed infrastructure policy issues for advanced manufacturing, because these are covered by Sir John’s recent work. However **it is important to note here the particularly acute infrastructure needs of advanced manufacturing, especially in relation to the growing need for high levels of reliable, high-bandwidth connectivity across more of the country and particularly on our major transport routes.**

³⁶Sir George Cox, *Overcoming Short-termism within British Business*, 2013

³⁷Sir John Armitt, *An independent review of long term infrastructure planning*, 2013

⁴⁰Skills, technologies, access to finance, procurement and sector partnerships

- 10.10** Sir John's proposal for a regular strategic review has been broadly welcomed in the business community as a way of enabling a longer-term perspective, whilst being compatible with our existing electoral and political systems. The sovereignty of Parliament would not be undermined, and a new government could still change plans. However, it would force a much more serious and strategic appraisal of options, costs and benefits. This is a model that, with some modification, would have valuable application in relation to two key areas of policy relating to advanced manufacturing.
- 10.11** The first such area is the innovation system. I have recommended an extension of the ring fence around the science budget to include technology spending, and an increase as soon as possible in this overall area of expenditure. There are other major areas of public expenditure including R&D Tax Credits and the Patent Box. Within the government's broad industrial strategy there are now numerous programmes focused on particular innovation activities, technologies and processes, for example the various Catapult centres, the 'Eight Great Technologies', and many smaller initiatives managed by the Technology Strategy Board.
- 10.12** This all adds up to a complex system of support for innovation, with billions of pounds of public resource at stake every year. It has evolved in a somewhat haphazard way, and it can be changed relatively easily at ministerial whim. Over time it will need to evolve, and government will need to ensure we are both getting value for public money and providing most support where it is most needed. We need to balance stability and clarity about strategic direction with periodic evaluation and evolution.
- 10.13** I recommend the institution of a regular five-yearly review across the whole of innovation policy, with a ten-year horizon. This Strategic Review of Innovation Support would consider all of the major areas of government activity and spending related to innovation, and set priorities for the coming ten years. It would be the vehicle for:
- evaluating the effectiveness and value for money of public support for innovation,
 - considering the balance between its various elements, and
 - ensuring we are targeting the right specific sectors, activities and technologies.
- 10.14** The second area I think would benefit from a regular strategic review is the wider system of industrial strategy. At present the government identifies five themes⁴⁰ and eleven sectors⁴¹ as well as the eight technologies just mentioned in the context of an innovation review. I strongly support the development of industrial sector strategies, which should never be confused with 'sector plans' on a command and control model. They not only help to coordinate the many different ways in which government can support business. They also help send signals to potential foreign investors that the UK government understands its role and takes it seriously. As with the innovation landscape, we should now seek to stabilise the system of industrial strategy for the long term.
- 10.15** A Strategic Review of Industrial Strategy would be similar in form to the Review of Innovation Support. Two particularly important functions would be:
- to evaluate the success of the existing industrial sector strategies, and
 - to ensure that the identified set of sectors is still appropriate.
- The first of these requires an important weakness with the existing sector strategies to be addressed. At the moment not all have sufficiently specific, meaningful and measurable objectives against which they can be properly evaluated. This should be rectified rapidly, or their impact will be significantly less than it should be.
- 10.16** Unlike the Armitage proposal for infrastructure, I do not think either of these new Strategic Reviews requires an independent statutory body. However, they would both require serious engagement with the relevant stakeholders including advanced manufacturing companies. They could be run from BIS, and supported by the resources of the Foresight Group based there. The obvious time to carry out both reviews is very early on in a new Parliament.

Recommendation X: In order to stabilise policy for the long-term, we should introduce two regular five-yearly strategic reviews, each with a ten-year horizon, to be carried out at the beginning of each Parliament:

- a. The Strategic Review of Innovation Support would consider all the major areas of government activity and spending related to innovation including the science and technology budgets, R&D Tax Credits and the Patent Box as well as the numerous programmes focused on specific innovation activities, technologies and processes. It would be the vehicle for evaluating the effectiveness and value for money of public support for innovation; considering the balance between its various different elements; ensuring we are targeting the right sectors, activities and technologies; and setting priorities for the coming ten years.
- b. The Strategic Review of Industrial Policy would evaluate the success of the existing industrial sector strategies; ensure that the identified sectors and themes are still appropriate, and identify the key strategic priorities looking forward ten years. The sector strategies should be updated without delay so they all include meaningful objectives against which they can be properly evaluated.

⁴⁰Skills, technologies, access to finance, procurement and sector partnerships

⁴¹Aerospace, agricultural technologies, automotive, construction, information economy, international education, life sciences, nuclear, offshore wind, oil & gas, professional and business services

APPENDIX: ORGANISATIONS AND INDIVIDUALS CONTRIBUTING TO THE REVIEW

The Expert Group

- Sir John Armitt, Chairman, City & Guilds
- Sharon Bleach, Vice President Global Quality, AstraZeneca
- Sir George Cox, Director, NYSE Euronext, inter alia
- Andy Hinch, Port Sunlight Works Director, Unilever
- Juergen Maier, Managing Director, Siemens UK and Ireland
- Hamid Mughal, Global Director of Manufacturing, Rolls Royce
- Andrew Robb, Chairman, Tata Steel Europe
- Terry Scuoler, Chief Executive, EEF

Supporting Organisations

- ADS the aerospace, defence, security and space industries organisation, in particular Paul Everitt (Chief Executive), Jeegar Kakkad (Chief Economist and Director of Policy)
- EEF the manufacturers' organisation, in particular Lee Hopley (Chief Economist), Verity O'Keefe (Employment and Skills Adviser), and Felicity Burch (Senior Economist)
- The Society of Motor Manufacturers and Traders, in particular Mike Hawes (Chief Executive), Konstanze Scharring (Director of Policy), Ian Henry (Specialist consultant)
- PWC, particularly Eimear Bishop
- KPMG, particularly Nathan Romeo

Other organisations and individuals providing evidence to the review

- Airbus
- Association of British Pharmaceutical Industries
- Bio Industries Association
- Cambridge Institute for Manufacturing
- Chemical Industries Association
- Confederation of British Industry
- Construction Products Association
- Food & Drink Federation
- Gatsby
- General Motors
- GlaxoSmithKline
- High Value Manufacturing Catapult
- Jaguar Land Rover
- Lloyds Bank
- Nestle
- Rolls Royce
- Royal Academy of Engineering
- Santander
- Tata Steel
- TUC
- Unite the Union
- Warwick Manufacturing Group

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