The Industrial Strategy Commission

Laying the Foundations

July 2017

industrialstrategycommission.org.uk @IndStrategyComm

Contents

Foreword *by Dame Kate Barker* 3

Executive Summary 4

Introduction 6

Part One | Why the UK needs a new industrial strategy 8

Weaknesses of the UK economy and the challenges ahead 8

Shortcomings of existing UK industrial policy practice 13

Technological change in an evolving global economy 16

Part Two | Objectives for a new industrial strategy 19

The purpose of an industrial strategy 19

Meeting the strategic goals of the state 20

Part Three | The foundations of industrial strategy 22

Institutional framework 23

Place 27

Science, research and innovation 31

Competition policy 36

Investment 38

Skills 42

The state's purchasing and regulating power 45

About the Commission 50

Foreword

We hope that the emerging findings set out in this report are a valuable independent contribution to the debate about the long-term future of the UK economy. It is a welcome backdrop to this debate to find political consensus exists now for a new and broadly-based industrial strategy, but it is also clear that such consensus may prove fragile over coming years. For this reason, our first and most important conclusion is that the UK needs a set of institutions which will ensure public and private sector bodies can plan on the basis of confidence in a shared long-term vision.

The business sector is also supportive of a long-term, clear and ambitious industrial strategy. This view is shared by firms of all sizes, and by new innovative entrepreneurs as well as established firms. There is a big shift in thinking about the weaknesses of the UK economy, the challenges now facing us, and how the role of the state should develop to tackle these issues; triggering welcome recognition of the need for fresh ideas.

After a decade when growth has generally disappointed, and facing the uncertainty following the EU referendum, policymakers should grasp the opportunity this consensus provides. The Government must quickly set out a clear timetable for the development and implementation of the new industrial strategy.

To be effective, the strategy must not be the property of a single government department; its goals must be shared across Whitehall departments, the devolved administrations, mayors and local authorities and the emerging regional tiers of government. This will help to stimulate the necessary partnerships with the private sector, and encourage vital new thinking about how to ensure that more places contribute to growth and share in its fruits.

Our report outlines what we believe are the key foundations of industrial strategy - and introduces fresh thinking in particular around new institutional structures and the importance of place, how public interventions should be assessed, the funding of research and development and the role of the government in procurement.

We hope politicians of all parties will engage with these emerging findings. Our work is ongoing; while we are not renewing a call for evidence, views and comments on these findings would be very welcome. Our final report will include more detail and specific recommendations - including suggestions about the metrics by which the UK's industrial strategy should be assessed.

Industrial strategy is a big topic and it is vital the UK is able to set a steady course towards the long-term objectives set out in this report, enabling the achievement of the present strategic goals which include decarbonisation and a sustainable health and social care system. I am very grateful to all those who have submitted evidence to help the Commission to reach this stage and very impressed by the joint working of the Commission team.

Dame Kate Barker
Chair of the Industrial Strategy Commission

Executive Summary

- **In the context of significant and growing economic uncertainty the UK has a compelling and overwhelming need for strategic economic management.**
- This is a critical moment for the development of a new industrial strategy. As the government prepares its new strategy and a new White Paper we urge ministers, members of the Opposition and officials across Whitehall, to engage with our findings, along with the devolved administrations, regional and local authorities. Before specific policies are developed it is essential that the correct foundations for the new industrial strategy are laid. This report set out what those foundations are.
- **Industrial strategy refers to the strategic, long-term co-ordination of all interactions between the state and the economy.** It should become the organising principle for UK supply-side economic policy across all government departments.
- Industrial strategy is not about the government handing out money to chosen businesses or sectors. The state's role is to create the conditions for long-term investments in productive and innovative business activity, ensuring that the economy is geared towards meeting key national challenges.
- **A new strategy must be shaped by analysis of current economic weaknesses and challenges and how to address them, an assessment of past and present policy shortcomings, and an understanding of future anticipated change.**
- The weaknesses and challenges affecting the UK economy are significant: poor productivity performance; pronounced regional differences in economic performance; a high degree of centralisation; a low rate of investment; uneven skills distribution; a weak trading performance and a weakening diffusion of innovation.
- The UK's current and past industrial policies and practices have significant shortcomings and are not sufficient to address the challenges facing the UK nor capitalise on future opportunities. Lessons must be learnt from them and the decision-making processes and understanding that underpins them altered.
- Understanding the rapid pace of technological change and its potential to reshape the economy must be integral to a new strategy. It should seek to capitalise on the opportunities technological change provides to meet societal goals and create prosperity.
- **Industrial strategy requires long-term objectives**. It should seek to achieve sustainable economic development and enable the economy to deliver prosperity that is widely shared; address persistent weaknesses in the UK economy; mobilise the private sector to drive innovation and productivity growth; establish a clear rationale for public investment to support industrial development and provide a framework for science and innovation investment.
- It should also achieve and maintain consensus and buy-in from policymakers, business and the public about its objectives, and engage all as long-term partners in meeting and shaping them.
- **An industrial strategy must be informed by a positive vision of a future destination for our country and motivated by an urgent sense of national purpose.** This can be achieved by reframing the challenges the country faces as strategic goals to be met.
- **Our assessment is that the strategic goals of the state are:** decarbonisation of the energy economy; ensuring adequate investment in infrastructure; developing a sustainable health and social care system; unlocking long-term investment; supporting high-value industries in building export capacity, and enabling growth in all parts of the UK.

- **The Commission has identified seven themes that must be considered foundational. The new strategy must be built upon them:**
  - **Institutional framework:** The UK lacks a robust institutional framework through which industrial strategy can be determined, implemented and monitored. A new institutional framework is needed to place industrial strategy at the heart of government, and embed it throughout the state. Strong industrial strategy institutions at the local and regional level and in the devolved administrations, and co-operation with other public and private sector institutions, will be required. An independent monitoring body is needed to hold policymakers accountable for the success of the strategy.
  - **Place:** A new strategy must build on the existing strengths of the UK's local economies and seek to improve productivity everywhere. The new strategy must provide adequate investment for weaker parts of the economy. It should recognise the powerful force of agglomeration and focus on creating high productivity clusters. Current methods of appraising public investments need to be changed: existing methodologies disproportionately benefit the parts of the UK where the economy is already strong, and do not properly account for the productivity gains that systemic intervention in regions with weaker economies should aim for.
  - **Science, research and innovation:** A new industrial strategy must take a holistic view of the UK's science, research and innovation landscape. It must seek to correct the UK's low research and development (R&D) intensity and address the large regional disparities in public and private R&D intensity. Increasing business R&D and translational R&D is likely to involve new institutions and new partnerships between public and private sector. A new strategy must balance support for high quality discovery research, research to support government priorities, and the development and commercialisation of research.
  - **Competition policy:** A strong competition and state aid regime is an essential component of industrial strategy, to enable innovation, new entry and structural change. Competition policy, regulatory functions and consumer policy need to be joined up to bring a strategic perspective to making sure markets function well.
  - **Investment:** A new strategy should seek to increase the UK's investment rate and achieve a more diverse financial ecosystem. The government should increase and co-ordinate public investment and ensure financial regulation is consistent with industrial strategy objectives. It should encourage industry, institutional investors and venture capital to increase and unlock long-term investment.
  - **Skills:** Skills policy must focus on addressing the UK's historic deficit in skills and on better utilising skills to drive higher growth and productivity. Skills policy must be more stable and holistic in its approach and better connected to other areas of policy. Policies are needed to both increase the overall supply of general technical skills and to develop the specific skills needed for particular sectors and places.
  - **The state's purchasing and regulating power:** The state's purchasing and regulating power should be used to drive innovation and long-term growth. This will require the focus of procurement policy to shift from solely achieving short-term cost savings and will require higher institutional tolerance of risk. A new strategy should also exploit the state's role as a lead customer for new technologies.

Introduction

The Industrial Strategy Commission was launched in March 2017. The Commission is an independent, authoritative inquiry into the development of a new, long-term industrial strategy for the UK. Since March the Commission has taken evidence from a wide range of business, policymakers and members of the public and had extensive engagement with key stakeholders. This report highlights the emerging findings and questions that have come through strongly from our evidence and engagement so far.

Summer 2017 is a critical moment for the UK economy. The political uncertainty caused by the election outcome comes with a backdrop of growing economic concerns, with signs that the uncertainty caused by Brexit is having a negative material impact on the economy. Now more than ever the UK requires strategic economic management - and this is what we mean by industrial strategy. Long-term strategic management of the economy can enable the UK to respond to current challenges and make the necessary investments in our people, places and industries to achieve greater future prosperity.

This is also a critical moment for the development of a new industrial strategy. The government is preparing its plan for a new strategy and we anticipate a White Paper in the coming months. Before specific policies are worked up it is essential the right components are considered and the correct analytical lens applied to them. In short, the foundations for a new industrial strategy are being laid. Now is the moment to ensure the design is sound before too much of the concrete is set.

This report sets our view on what those foundations ought to be. It also outlines why the UK needs a new industrial strategy and what its objectives should be. *Why* we need a new strategy and *what* that strategy must address should not be seen as separate nor considered in isolation - they are two sides of the same coin.

But before we establish what industrial strategy *is*, and *should* be, it is important to set out *what it is not*. Industrial strategy is not, and should not be, about the government handing out money to chosen businesses or sectors to 'pick winners' or compensate 'losers'. Sceptics often take the term 'industrial policy' to refer to state handouts. We mean the term to refer to strategic economic management. This does require long-term public investment but the state's main role is to co-ordinate and to create the conditions for investments, not to be their primary source. The distinction between state and market is a false dichotomy; the choice is between an intended and an accidental strategy.

It is also important to state that whilst the UK has had many *policies* for industries, policies for science and innovation, policies for skills and so on - it has never had the comprehensive industrial *strategy* that the UK needs. This must now change.

An industrial strategy encompasses the strategic co-ordination of all economic interactions between the state and the private sector. It should be informed by a positive vision of a future destination for our country, and motivated by an urgent sense of national purpose. This can be achieved by focusing on meeting the state's strategic goals. It is guided by lessons learnt from the past, sound analysis of current problems and how to address them, and by anticipating and preparing for the future.

A new industrial strategy should become the organising principle for UK supply-side economic policy across all government departments, in the devolved administrations, local authorities and in the emerging tiers of regional government. Its time-horizon must go beyond the lifetime of single parliaments and governments. It requires a long-term policy framework that can anticipate and adapt to future change, and must be co-ordinated through a stable institutional framework. The benefits of this will become clear over time, and should be monitored in order to bring to an end the periodic questioning of whether the UK requires an industrial strategy.

A new industrial strategy should seek to:

- Strategically co-ordinate interactions between public and private sector to achieve sustainable economic development and enable the economy to deliver prosperity in the public interest.
- Address persistent weaknesses in the UK economy such as low productivity, entrenched geographical inequalities and centralisation, and increase the UK's resilience to financial crisis.
- Mobilise the private sector to drive innovation and productivity growth across the economy.
- Establish a clear rationale for public investment to support industrial development, for example in infrastructure, skills, business support and research.
- Provide a framework for science and innovation investment.
- Achieve and maintain consensus and buy-in from policymakers, business and the public about its objectives, and engage all as long-term partners in meeting and shaping those objectives.

Part One of the report focuses on why the UK needs a new industrial strategy. Part Two outlines the objectives of a new industrial strategy and the strategic goals of the state. Part Three sets out our view on what the foundations of industrial strategy must be. Our final report in the autumn will expand on the thinking outlined here and make more specific recommendations.

Part One | Why the UK needs a new industrial strategy

A new industrial strategy must start with the UK as it is in 2017. It must seek to identify future opportunities that will enable the economy to develop and to create prosperity, but it must also address existing problems and challenges.

To be successful strategic economic management must be guided by lessons learnt from the past, by analysis of current weaknesses and challenges and how to address them, and by anticipating and preparing for the future.

Our evidence gathering and engagement has considered three major strands that must be addressed:

1) Weaknesses within the UK's economy and challenges ahead
2) Shortcomings of existing UK industrial policy practice
3) Rapid technological change in an evolving global economy

Taken together they demonstrate why the UK needs a new industrial strategy and why progress on a fresh approach is vital.

Weaknesses of the UK economy and the challenges ahead

The weaknesses and challenges affecting the UK economy are significant and are not recent but have developed over decades. In the decade since the financial crisis some have become more apparent, whilst others have worsened, and they are underlined by the new uncertainties caused by Brexit. To highlight the challenges is not a counsel of despair, but necessary to understand the starting point and context for a new industrial strategy.

The challenges and weaknesses outlined here are not insurmountable nor should they be accepted as permanent structural features of the economy. However, unless they are addressed in a strategic way they will ultimately hold back the development of the UK economy.

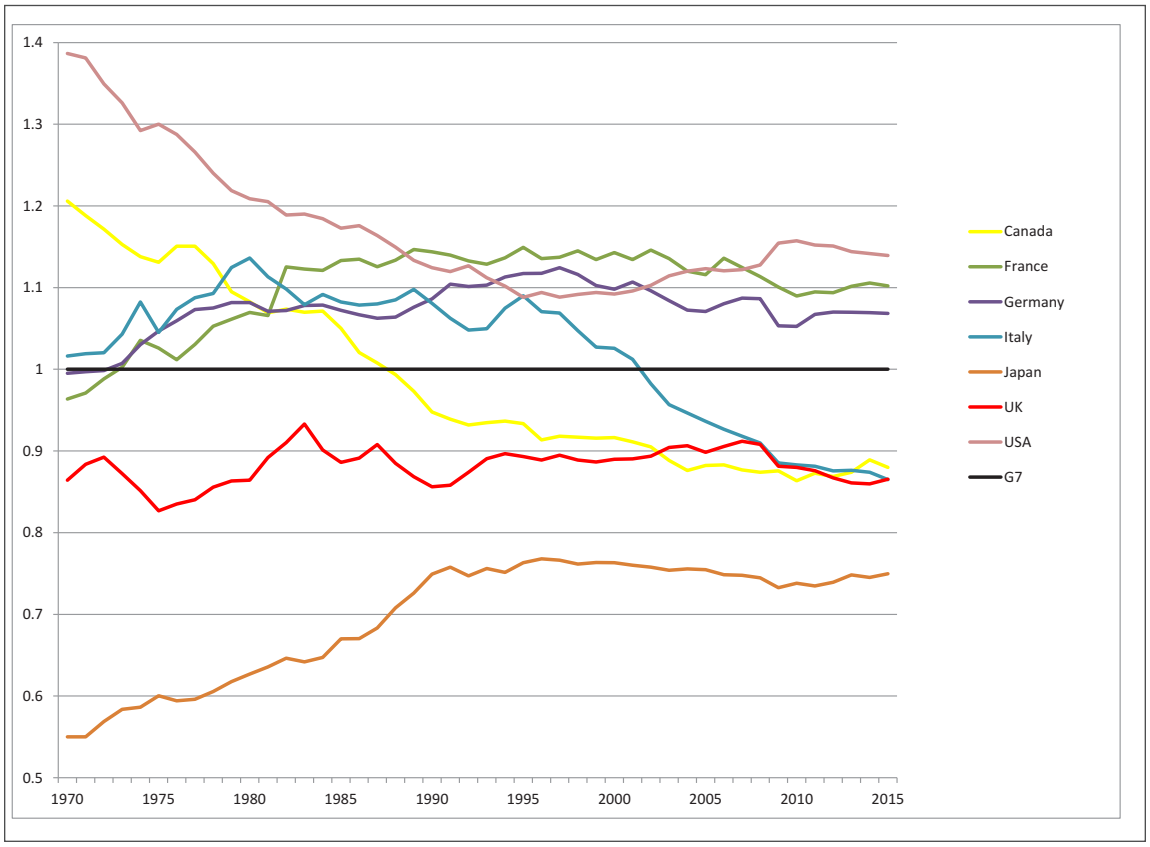
Poor productivity performance

Productivity growth is essential for rising living standards and a sustainable fiscal situation. Yet over the long-term UK productivity has underperformed relative to other advanced economies. The UK has experienced periods of productivity catch-up with our competitor nations but the long-run overall level has remained lower. UK productivity in 2015 was 16% lower than the G7 average.[1] The UK has also experienced a pronounced slowdown in productivity growth in the decade since the financial crisis - the so-called productivity puzzle, in part due to the financial services sector and declining North Sea oil.[2] This has coincided with an unprecedented slowdown in real wage-growth over the same period.

[1] Office for National Statistics (2017) *International comparisons of UK productivity (ICP), final estimates: 2015* https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/internationalcomparisonsofproductivityfinalestimates/2015

[2] Goodridge, P. Haskel, J. and Wallis, G. (2016) 'Accounting for the UK Productivity Puzzle: A Decomposition and Predictions' *Economica* http://onlinelibrary.wiley.com/doi/10.1111/ecca.12219/full

Figure 1: G7 labour productivity levels relative to the G7 Average[3]

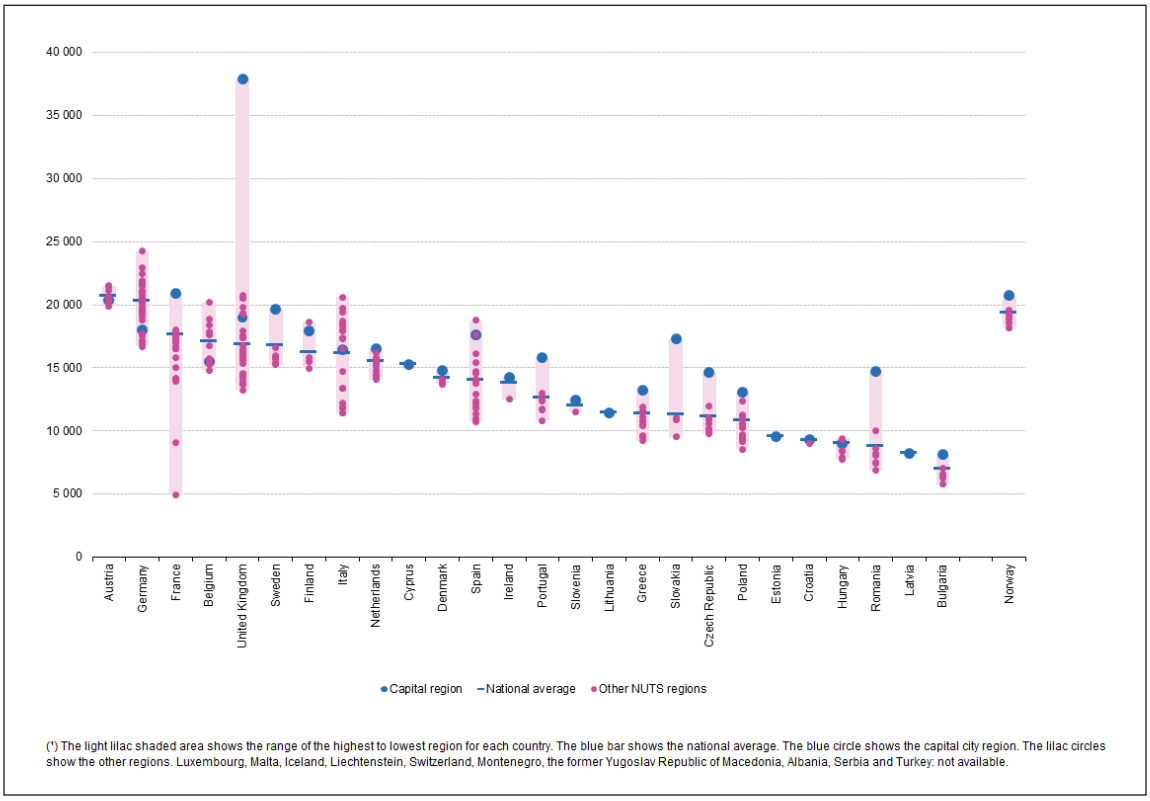


Pronounced regional differences in economic performance

The UK is by far the most regionally unequal EU economy. All core cities outside London, with the exception of Bristol and Aberdeen, have productivity lower than the national average. Many de-industrialised areas, often on the fringes of city regions, present apparently intractable combinations of social, educational and economic problems, while some of the most deprived communities are to be found on the coasts and in rural peripheries.

[3] OECD (2017) *GDP per hour worked (indicator)* https://data.oecd.org/lprdty/gdp-per-hour-worked.htm

Figure 2: Disposable income of private households relative to population size, by NUTS 2 regions, 2013 (Euros, purchasing power consumption standard per inhabitant)[4]



(') The light lilac shaded area shows the range of the highest to lowest region for each country. The blue bar shows the national average. The blue circle shows the capital city region. The lilac circles show the other regions. Luxembourg, Malta, Iceland, Liechtenstein, Switzerland, Montenegro, the former Yugoslav Republic of Macedonia, Albania, Serbia and Turkey: not available.

A highly centralised economy

Most economies have a small number of very large, dense and highly productive city regions. The UK is unique amongst OECD member states in only having one, London. Not having a second or third large urban region leads to high congestion costs in the capital, draws highly productive activity and jobs from elsewhere in the UK to London, and requires policy actions to be taken to prevent overheating earlier than would be desirable for other regions.

A low rate of investment

The UK has a low investment rate, with business investment lower than in most other G7 countries. The UK's capital allocation mechanisms, in the context of a global financial system, are widely recognised as failing to enable industrial development by not providing enough patient capital investment. This has long been acknowledged as a weakness of the UK economy, as evidenced by frequent government reviews of the UK's investment landscape.[5] A lack of diversity in the financial ecosystem contributes to longstanding concerns that new and existing high-productivity technologies, businesses and innovations often do not receive sufficient long-term investment for their sustainable development.

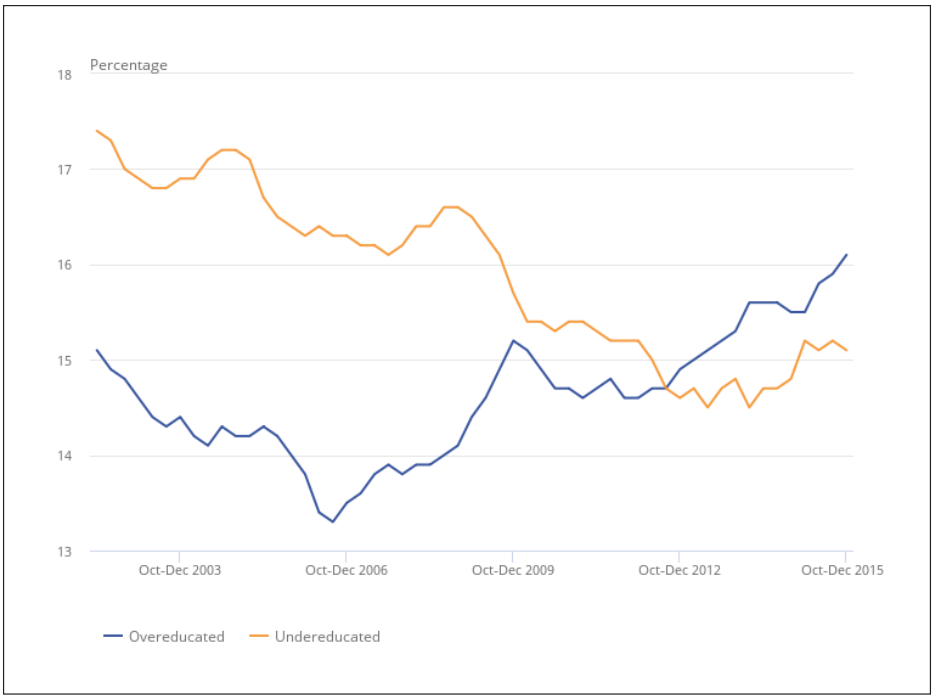
[4] Figure reproduced from Eurostat (2016) *GDP at regional level* http://ec.europa.eu/eurostat/statistics-explained/index.php/GDP_at_regional_level

[5] Most recently, the Myners Review of Institutional Investment (2001); the Kay Review of UK Equity Markets and Long-Term Decision Making (2012); the Patient Capital Review (2017).

Uneven skills distribution

The UK economy suffers from a highly uneven skills distribution amongst the population. There is a 'long tail' of citizens with low or no qualifications. Only 10% of 20-45 year olds hold technical education as their highest qualification, placing the UK 16th out of 20 OECD countries.[6] By 2020, the UK is set to fall to 28th out of 32 OECD countries for intermediate skills.[7] A labour market with a high proportion of low-skilled individuals negatively affects productivity and pay growth, and prevents individuals from being able to fulfil their potential. This is also an issue for higher level skills where, even though the UK has a comparatively high proportion of the workforce educated to degree level and above, it is not clear that these skills are being effectively utilised. In 2014 the UK had the fifth highest level of skills 'mismatch' in Europe with 28.9% of the workforce in jobs not suited to their skill level.[8] Since 2012 there has been an increase in the percentage of the UK workforce who are overeducated for their job and who are undereducated for their job.

Figure 3: Percentage of those in employment aged 16-64 classed as over or undereducated, 2002-2015[9]



[6] OECD (2014) *Skills Beyond School Synthesis Report* https://www.oecd.org/edu/skills-beyond-school/Skills-Beyond-School-Synthesis-Report.pdf

[7] The UK Commission for Employment and Skills 2015 which provides an assessment of current and future trends in the UK's skill profile compared to OECD member states https://www.gov.uk/government/publications/uk-skills-levels-and-international-competitiveness-2014

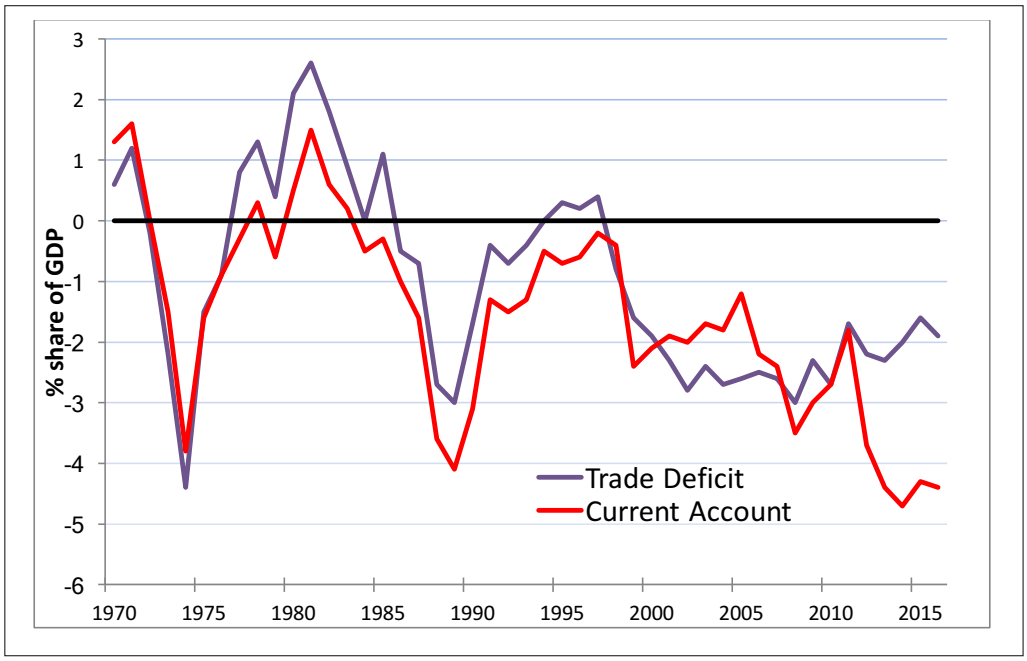
[8] ILO (2014) *Skills mismatch in Europe* http://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_315623.pdf; The ILO report found that 15.0% of the UK workforce had a higher than average education level for their occupation (overeducated), and 13.9% had a lower than average education level for their occupation (undereducated).

[9] Figure reproduced from ONS (2016) *Analysis of the UK labour market - estimates of skills mismatch using measures of over and under education: 2015* https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/analysisoftheuklabourmarketestimatesofskillsmismatchusingmeasuresofoverandundereducation/2015;

Weak trading performance and a changing trade landscape

Trade between countries is vital to drive innovation, productivity growth and deliver prosperity. Yet on most measures the UK has a weak trading performance. The current account balance is in deficit and has deteriorated in recent years. The UK also has a large and persistent trade deficit. This weak trading performance is in the context of great uncertainty about the UK's future trade relationship with the EU, its major trade partner, and a highly uncertain global trade landscape where the language of protectionism and economic nationalism has returned.

Figure 4: UK Current Account and Trade Deficit as a percentage of GDP, 1970-2016[10]



Weakening diffusion of innovation

Across advanced economies the mechanisms for diffusing innovative new technologies, skills and business practices throughout the economy are seen to be weakening. The OECD has highlighted how a breakdown of the 'innovation diffusion machine' manifests itself as a growing divide at the firm level between internationally competitive companies at the technological frontier, and a growing long tail of underperforming firms.[11] This weakening - a challenge for the UK and other leading economies - has significant implications for productivity growth and in turn future growth. Related to this are concerns about the poor quality of management in some UK firms.[12] The UK has a longer tail of underperforming firms than other OECD states, as recognised by Sir Charlie Mayfield's private sector-led Productivity Leadership Group.[13] Poor management practices reduce productivity and economic returns, and are most pronounced where competition is weak and corporate governance sub-optimal.

[10] ONS (2016) *Balance of Payments: Oct to Dec and annual 2016 (release 31/3/17)*

https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/balanceofpayments/octtodecandannual2016

[11] OECD (2015) *The Future of Productivity* http://www.oecd.org/economy/the-future-of-productivity.htm

[12] Bloom N and Van Reenen, J (2007), 'Measuring and explaining management practices across firms and countries', *Quarterly Journal of Economics*, Vol CXXII (4).

[13] Productivity Leadership Group (2016) *How good is your business really? Raising our ambitions for business performance* https://howgoodisyourbusinessreally.co.uk/downloads/reports/how-good-is-your-business-really.pdf

Shortcomings of existing UK industrial policy practice

The announcement by Prime Minister Theresa May on first taking office in 2016 that her government would develop a new industrial strategy was welcome. As stated earlier, we do not believe the UK has ever had the comprehensive industrial strategy that it needs, but it should not be assumed that previous governments did not have industrial policies. Moreover, the absence of an explicitly defined industrial strategy does not mean that governments do not act to steer, intervene and shape the economy; rather it means that interactions between the state and the economy are ad-hoc and uncoordinated, and thus they are not *strategic*. As a result they are less effective than they could be.

The Commission's evidence and engagement has identified significant shortcomings with the UK's current and past industrial policies and practices. Learning the necessary lessons from them and altering the thinking that underpins them is critical for a new strategy to be a success.

Industrial strategy has never been fully embedded within thinking and policy practice throughout the state. An industrial strategy must be built into the very core of the UK state, not revived as an idea and bolted on once in a generation. Industrial strategy has never been seen as central to *all* policy areas that impinge upon the economy. It should be recognised and established as *the* organising principle for all UK supply-side economic policy. The failure to embed industrial strategy throughout the state leads UK policymakers to treat industrial policies as distinct from and often peripheral to other areas of policy, including specifically, from macroeconomic policy. Too often within Whitehall it has simply been considered to be what the business or industry department does, and with industrial policies developed and implemented within departmental silos without co-ordination across government. The Treasury, in particular, has not been consistently committed to strategic supply-side economy policy.[14]

Industrial policies have not been developed with a whole economy approach. The failure to embed industrial strategy throughout the state helps explains why industrial policies have not been developed with a whole economy perspective, and indeed are often thought of in terms of individual sectors. As a result whole sectors and core parts of the economy (employing large numbers of people) are too often not thought about strategically. Health and social care, or retail, are prime examples. Nor, more broadly, does social policy often get thought about in terms of industrial strategy. Welfare policies or education policies have direct implications for the economy and it is illogical to view them as being separate from industrial strategy.

Moreover, there is no holistic overview of the policy landscape. This means unintended consequences and spillover effects from policies, positive and negative, are missed and not learnt from. The persistence of departmental silos sustains this problem.

Industrial policies have been designed with a narrow and deficient understanding of sectors. 'Horizontal' industrial policy, which aims to create conditions that improve productivity unselectively across the whole economy, is necessary but not sufficient to tackle the very deep-seated productivity problems of the UK's economy. More selective interventions will be necessary, but sector-focused 'vertical' policy has pitfalls.

[14] Kingman, J. (2016) 'The Treasury and the supply side', speech delivered on 20 October https://www.scribd.com/document/328294000/Kingman-Speech

Many economists argue strongly against sector-focused interventions. Careful design is needed to ensure that competition is not blunted, that lobbying and rent-seeking by well-organised groups of incumbents is not rewarded at the expense of the wider economy, and that new, challenger firms and sectors are not placed at a disadvantage. Interventions should be focused on the future, rather than on maintaining the position of fading industries, and judged by the extent to which they create measurable economic value.

Successful sector-based interventions are possible - the automotive sector since 2008 is one example where industry actors have been able to define a common set of priorities with government in response to very challenging conditions, and strong shared institutions for innovation and skills have developed. The case for continued sector-based intervention here is based on analysis of future markets and the strong potential for both incumbents and new entrants in the UK to capitalise on them. The expectation of further rapid technological change driven by moves to ultra-low emission, autonomous and connected vehicles provides enormous opportunities while putting great pressure on the ability of incumbents to react fast enough in a very competitive global market.

But not all sectors can be so clearly defined. A successful new industrial strategy will require new ways to understand, map and quantify relationships between different actors in the economy; our current sector classification is too rigid and many categories are increasingly irrelevant. We welcome the work being undertaken by the Office for National Statistics on this. Even for such a broad classification as 'manufacturing', we can see that technology-driven changes in business models substantially blur the lines between manufacturing and high-value services. Activities in design, marketing and other professional services, previously included in the manufacturing economy, are now classified as falling outside the manufacturing sectors, despite being crucial to the creation of value in those sectors, while conversely manufacturing firms are increasingly seeking to extract more value from additional services that can be associated with their physical products, in the process of 'servitisation'. [15]

Future industrial strategy should move beyond the sector approach to identify and analyse whole value chains, judging interventions by how effectively they can support the highest value-creating activities in existing and emerging industries. To achieve this there must be far greater understanding by government of how modern businesses operate and make decisions. Whitehall officials need to be given the scope to develop their knowledge of the economy, and 'get their shoes dirty'.[16] Spending significant amounts of time around the UK, working with business and regional policymakers, to find and understand industries and places in which the UK has, or could have genuine comparative advantage, will help to identify the correct policies to support them.

Industrial policy and practices are undermined by the decision-making processes that underpin them. A pronounced problem arises from the standard practice used to assess potential public sector investments based on standard cost-benefit analysis methodologies. Such methodologies tend to undervalue potential non-linear benefits from investments that will accrue over time, or step changes in behaviour made possible by an investment. They reward more and more over time the incumbents and places that are already successful. They also reinforce existing patterns of agglomeration rather than being able to identify and accelerate agglomeration dynamics with potentially large benefits. Part Three examines this in more detail.

[15] Helo, P. et al (2017) 'Servitization: Service Infusion in Manufacturing', *Designing and Managing Industrial Product-Service Systems, Springer Briefs in Operations Management*
http://link.springer.com/chapter/10.1007/978-3-319-40430-1_2

[16] O'Connor, S. (2016) 'The best economist is one with dirty shoes' *Financial Times*
https://www.ft.com/content/07d4e7c6-4d90-11e6-88c5-db83e98a590a

Linked to this is the persistent lack of recognition that there are trade-offs between efficiency and equity. An over-reliance on cost-benefit analysis methodologies, without judgement, inhibits policymakers from recognising this trade-off and steers decisions about investments towards short-term efficiency over long-term benefits. Industrial strategy involves choices being made by governments and it is perfectly legitimate for policy decisions to seek outcomes weighted towards equity, or where the benefits may not be realised for some time.

In addition, policies have too often not been aligned with the economic realities, with investments falling into the trap of 'jam spreading'. A new industrial strategy must be underpinned by a clear strategic rationale for investments, especially when resources may be scarce, and seek to avoid spreading government interventions too thinly across different places. State investment in the 2000s in nanotechnology illustrates this point. Twenty-four nanotechnology facilities were created across the country, with many in locations where they struggled to attract private investment.[17] Most have since closed and a strategic decision should have been taken to create a small number of larger clusters. In the present moment, the decision about Channel 4's relocation should be made with a strategic aim of capitalising on the benefits of clustering.

Similarly, state investments have been made with too much blind faith that radical innovations will come to market and translate into economic benefits. Too little emphasis has been given to technology transfer and mechanisms to diffuse innovative technologies, skills and business practices throughout the economy.

Policy decision-making and accountability in the UK is weakened by centralisation and the absence of a robust institutional framework. A frequently changing departmental framework at the national level and a history of unstable, and often absent, institutional structures at regional and local authority levels both indicate the marginal nature of industrial strategy within the core function of government. Policy decision-making and accountability is further weakened by the UK's high degree of political and administrative centralisation compared to its OECD peers. The clustering of policymakers in the capital privileges a view of the economy that is equally centralised. Decision makers lack information about the strengths and weaknesses of cities and regions outside of London and the South East and there is a lack of accountability in terms of delivering, *or not delivering*, policies that enable economic growth in all parts of the UK.

Finally, the industrial policymaking mindset is not sufficiently focused on market creation and capitalising on emerging markets. Industrial policies are often, through necessity, developed in response to a moment of crisis relating to a market failure or external shocks. Too often industrial policies are just seen as a response to fight fires and respond to failures. This contributes to the prevailing discourse around industrial policy in the UK being cast in almost wholly reactive and negative terms. A new industrial strategy must be shaped in proactive terms with interventions focused on achieving future success through market creation and seizing new opportunities.

[17] This programme was highlighted by the then science minister, David Willetts, giving evidence to the House of Commons Science and Technology Select Committee in July 2010 https://www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/369/10072202.htm

Technological change in an evolving global economy

The ultimate driver of sustainable productivity growth is technological change, which can dramatically reduce the cost of existing products and services, create new products, and improve existing processes. New technologies generate new ways of organising services and enable the development of entirely new kinds of businesses and industries. To capture fully the value of the benefits of technological change, a modern industrial strategy must have at its heart a sophisticated understanding of the nature of that change, its possible and likely trajectories and recognise the UK's position in an evolving global economy.

Understanding and steering technological change

Currently, the economic impact of technological change presents us with an apparent paradox. The effect of new technologies, and the pace of their change, seems obvious in our everyday lives. And yet, across advanced economies that one would expect to be operating at the technology frontier, there has been a long-term slowdown in productivity growth.

How to resolve the paradox? Part of it may be accounted for mismeasurement - new technologies may lead to value not completely captured in GDP statistics.[18] But there is a more fundamental point: technology is not a single thing that proceeds evenly with a single rate of change, nor is it predestined to unfold in a particular way. Very fast progress in one area of technology (information and communications, for example) may not be able to compensate for much slower technological change in other sectors.

Industrial strategy needs to be able to anticipate technological change - and indeed, to be able to steer technological change in ways that meet societal goals. But technological change takes place in a global context, and this places limits on the agency of national governments. It is the private sector - typically multinational in character - that drives innovation in the market. The government is not omnipotent in setting the pace and direction of technological change, but it would be a mistake to conclude that it is impotent. The history of recent technology gives many examples of world-changing innovations whose development has depended strongly on state sponsorship, typically brought to market through considerable subsequent private sector research and development (R&D) and product development.[19] The state's ability to co-ordinate activities, shoulder risks, set competition policy and create markets are key.

A focus on diffusion, not disruption

But equally, there are dangers of industrial strategy being focused on, and distracted by, the new and novel.[20] Despite inevitable labour market disruptions, in twenty years many people will be doing jobs that are essentially the same as today. Infrastructures are very long-lasting; using, maintaining and upgrading those infrastructures may be less glamorous than the promise of massive disruptive change, but this will continue to account for a large part of the economy.

While new technology will affect the whole economy - from the innovation frontier through to more foundational parts of economy - policy must focus on accelerating the diffusion of technology. How to increase the productivity of existing jobs (in the public and private sector)

[18] Bean, C. (2016) I*ndependent review of UK economic statistics* https://www.gov.uk/government/publications/independent-review-of-uk-economic-statistics-final-report

[19] Mazzucato, M. (2013) *The Entrepreneurial State: Debunking Private vs. Public Sector Myths*. London: Anthem Press; Janeway, W.H. (2012) *Doing Capitalism in the Innovation Economy: Markets, Speculation and the State*. Cambridge: Cambridge University Press.

[20] Edgerton, D. (2008) *The Shock Of The Old: Technology and Global History since* 1900. London: Profile Books

through the adoption of new practices and business models that new technologies can enable is crucial. Skills development at all levels is essential too.

Balanced discussion of the economic potential of new technologies is made more difficult by a climate of excessive neophilia and susceptibility to hype.[21] Uncritical reporting of supposed new technological breakthroughs and of creative destruction is often motivated by salesmanship. History demonstrates that many emerging technologies can, despite the excitement that surrounds them in their early stages, (a) take much longer than anticipated to make an impact, (b) not find the markets they anticipated, and (c) fail to make a material impact on the economy as a whole.

Four areas of technological change

With these notes of caution, we do draw attention to four broad areas of new technologically-driven change that seem to be particularly important for an industrial strategy to consider, as they will involve social, ethical and political choices which should not be made by default. Their current and potential impacts are being felt in the UK and globally.

1. **Energy markets.** Rapid uptake of renewable energies, albeit from a low base, has led to remarkable cost reductions meaning unsubsidized costs of renewable energy are now competitive with fossil fuels in many parts of the world. This progress is not yet enough to meet the huge challenge of decarbonising the energy system, but it is already severely disrupting energy markets, overturning the assumptions (and business models) of incumbent companies and governments, and triggering the urgent need for better energy storage techniques and for smart grids which more dynamically match energy supply and demand.
2. **Information and communication technologies (ICT)**. The current phase of the ICT transformation is centred upon increasing digital connectivity, the ubiquity of net-connected sensors, and new techniques for extracting information from the resulting unstructured masses of data (machine learning). This offers great potential for new markets to be created and for productivity gains. A further example of the current transformative effects of ICT is the incorporation of digital technologies in manufacturing which is enabling successful manufacturing firms to move their focus from creating physical artefacts to capture more of the value chain.[22]
3. **City living, infrastructure and mobility**. The move towards electrification of vehicles is quickening, driven as much by the problem of urban air quality as by the need to reduce CO2 emissions, and in parallel major efforts are being made to create driverless, connected vehicles capable of autonomous action. These developments may have far-reaching effects on our infrastructure, physical environment and lifestyles, from the need to creating charging points to supplying shops and simply how we get from A to B.

[21] Nuffield Council on Bioethics (2012) *Emerging biotechnologies: technology, choice and the public good,* http://nuffieldbioethics.org/project/emerging-biotechnologies; Jones, R. A.L. (2008), 'The Economy of Promises', *Nature Nanotechnology* 3, 65 - 66 http://www.nature.com/nnano/journal/v3/n2/abs/nnano.2008.14.html

[22] National Academies Press (2015) *Making Value for America: Embracing the Future of Manufacturing, Technology, and Work* http://www.nap.edu/catalog/19483/making-value-for-america-embracing-the-future-of-manufacturing-technology; Kagermann, H. et al (2013) 'Securing the future of German manufacturing industry: Recommendations for implementing the strategic initiative INDUSTRIE 4.0', *Final report of the Industrie 4.0 Working Group, Acatech* http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf

4. **Healthcare.** Healthcare demonstrates the potential benefits of new technological opportunities, but also their potential shortcomings and risks. Enormous, and as yet barely realized, opportunities are anticipated from the expansion of medical data about populations, from genomic information, to physiological data from wearable devices, and the integration of medical information. Yet many sensitive societal and ethical issues are raised by these developments. More negatively, in ageing populations, substantial increases in neurodegenerative diseases are projected. These diseases remain stubbornly resistant to the development of new effective therapies - a reflection of a more general problem of apparent diminishing returns in drug discovery.[23]

These four areas illustrate the huge potential of new technologies to help meet societal goals and create employment and prosperity. Yet, as noted above, none of this is predestined to happen. History tells us that for the opportunities and value of technological changes to be realised strategic co-ordination between the state and private sector is essential.

Conclusion

We have set out these three strands to be clear about the task at hand. Taken together they demonstrate the UK's need for strategic economic management. The UK economy has fundamental and persistent weaknesses and faces significant challenges ahead, its existing industrial policies and practices are not sufficient to address those challenges nor capitalise on future opportunities, and the rapid pace of technological change globally is reshaping the economy and daily life. The UK cannot stand still - fresh ideas and approaches are needed.

The challenges are large but so are the potential gains. The UK's people, places and industries have great strengths and huge untapped potential. In this post-Brexit moment and nearly 10 years on from the financial crisis, across the political spectrum and throughout the country, there is a feeling that things cannot continue as before. Industrial strategy can be the means through which the problems we have outlined are addressed, future challenges met and our strengths built on. Laying the correct foundations is essential.

A significant opportunity therefore exists. To achieve consensus and buy-in from policymakers, business and the public a new industrial strategy must focus on the UK's strengths and be informed by a positive vision of a future destination for our country that benefits all.

The objectives for a new industrial strategy and developing this vision are considered in Part Two.

[23] Scannell, J. W., Blanckley, A., Boldon, H. and Warrington, B. (2012), 'Diagnosing the decline in pharmaceutical R&D efficiency' *Nature Reviews Drug Discovery* 11, 191-200.

Part Two | Objectives for a new industrial strategy

An industrial strategy encompasses the strategic co-ordination of all interactions between the state and the private sector economy. At its heart should be a positive vision of a future destination for our country. Strategic economic management requires long-term objectives.

Industrial strategy should also be motivated by an urgent sense of national purpose. This can be achieved through a clear focus on meeting the strategic goals of the state, which will change and evolve over time. Here we set out our emerging ideas about what those goals are in 2017, but first examine the purpose of an industrial strategy.

The purpose of an industrial strategy

The state has a major presence in advanced economies, and has some universal essential functions. First and foremost it must assure security and defence. It must provide basic infrastructure and public goods; enable improvements in health and living standards over the long-term, and equip citizens with the capabilities to accomplish the things they value and to participate in civic life. The fundamental purpose of an industrial strategy is to co-ordinate activities to enable the state to fulfil all of these functions.

Economic outcomes will depend to a large degree on private sector businesses and individuals, and third sector bodies; but there are some roles that only the state can play.

Co-ordination is necessary to align individual activities across the economy; this can range from setting technical standards so a market can reach viable scale, to aligning investments in a particular place (to capture agglomeration economies), to providing a more skilled and accredited workforce so employers will opt for higher value production.

The state can *pool risk* when the returns from innovation are too uncertain for individual investors. This may be especially important when innovation is needed to address known long-term challenges facing society (such as ageing or climate change). The state can also *create markets* and substitute for *missing markets* (such as lending to a portfolio of early-stage businesses, which can find it hard to raise private finance because of information asymmetries).

State provision of *public goods* such as research is essential, as the private sector will under-provide these and try to prevent others from accessing them. The government will also need to address *externalities*, where the social costs or benefits of an activity diverge from the private.

If there is a general belief that individuals' economic activity is essentially independent, with little impact on others, it will lead to the conclusion that these theoretical roles for the state are in practice quite restricted. This general view, combined with the experiences of the 1970s, has been behind the antipathy to robust industrial policies in the UK for the past generation.

It is, however, entirely circular reasoning. The underlying belief is highly misleading. People and businesses in modern economies are extremely interdependent; all their actions affect many others. Technological change is rapid, and will be necessary, but has profoundly uncertain outcomes. There are significant social and economic challenges (such as epidemics, financial crises) that are global in scope. The international environment for production, trade and investment is in flux, both with regard to the UK's future relationship with the EU27 and beyond.

Industrial strategy is therefore much more than the narrow version of subsidies to specific businesses or sectors that some sceptics imagine - although the government will need to make some forward-looking choices about investment in research and new technologies.

The key purpose of industrial strategy is therefore to deliver and co-ordinate investment - public and private - in the long-term interest of the country's inhabitants in the context of inevitable uncertainty, rapid technological change, and major global challenges. The state can achieve this through co-ordination, risk sharing and the government's own investment choices, given its current strategic goals.

Meeting the strategic goals of the state

The state has essential and unchanging functions, as outlined above. They are as necessary today as they were 100 years ago and will continue to be so.

But at any time a country needs to address a range of urgent and specific challenges. They are the highest priorities for the population and will affect society and economy. And it is the state through its unique ability to co-ordinate, share risks and make investments that can ensure these challenges are met - and industrial strategy is the means by which it can do so.

As we have set out an industrial strategy must be informed by a positive vision of a future destination for our country, and motivated by an urgent sense of national purpose. This can be achieved by reframing the current challenges that a country faces as strategic goals to be met.

Unlike the essential functions of the state, the strategic goals of the state will evolve over time. New goals will emerge to replace those that are met or become less urgent.

Our current assessment is that the strategic goals for the UK state in 2017 are:

- Decarbonisation of the energy economy whilst maintaining affordability and security of the energy supply.
- Ensuring adequate investment in infrastructure to meet current and future needs and priorities.
- Developing a sustainable health and social care system.
- Unlocking long-term investment - and creating a stable environment for long-term investments.
- Supporting established and emerging high-value industries - and building export capacity in a changing trading environment.
- Enabling growth in parts of the UK outside London and the South East in order to increase the UK's overall productivity and growth.

These six goals cut across state and economy. They are neither sector nor industry-specific nor the responsibility of single government departments. It will only be possible to meet these goals with an industrial strategy that is embedded throughout the state and if *all* supply-side economic policy is co-ordinated towards meeting them.

And whilst the state must play a co-ordinating role, it is only through a partnership with the private economy that they will be met. Such a partnership will only be forged and sustained if there is strong political and societal consensus for a new industrial strategy and its goals. The six goals outlined here have been shaped by the Commission's evidence-gathering and engagement. We believe they will be recognised across the UK as demanding urgent attention, but we would welcome further views on them. Our final report will set out more details about the goals and consider the metrics through which success of a new industrial strategy can be assessed.

Conclusion

Strategic economic management requires long-term objectives and a positive vision of a future destination for our country. The strategic goals of the state outlined here are considerable and urgent - but achievable. A pro-active and long-term focus on how to meet them will give a sharp clarity to a new industrial strategy that has previously been lacking. Minds should be focused by the potential to achieve outcomes that will benefit current and future generations, and by the huge wealth and greater prosperity that can be created in meeting them. The UK's current challenges contain the promise of future rewards. In Part Three we outline some of our emerging thinking in relation to the foundational issues upon which a new industrial strategy must be built.

Part Three | The foundations of industrial strategy

Through the Commission's process of evidence-gathering and analysis, and our engagement with businesses, policymakers, academics and key stakeholders, a number of core themes have emerged clearly and consistently. We explore these themes here.

This is not an exhaustive list of what should be included in a new industrial strategy, but we strongly believe that unless these themes are treated as foundational to a new strategy then the goals of the state, outlined in Part Two, will not be met - and ultimately the UK will not achieve the strategic economic management that it needs.

It is important also to acknowledge the strong links and synergies between each of the foundational themes we discuss here. As with the goals we outlined in Part Two they cannot easily, *and rightly*, be broken into sectors, departmental responsibilities or industries - nor should any attempt be made to do so. They range across the state and the entire UK economy and cross-cut each other. We believe they must be the foundations upon which a new industrial strategy is built.

Institutional framework

One of the long-running characteristics of the UK's industrial policy weakness is the absence of a robust institutional framework through which industrial strategy can be determined, implemented and monitored. This characteristic is both a cause and a consequence of the tendency in UK political discourse to marginalise the importance of industrial strategy or industrial policy as a core function of government.

The UK has two different but related problems in this regard. Firstly, its industrial policy bodies have traditionally been rather weak within the wider institutional framework of Whitehall. The Department for Business, Energy and Industrial Strategy (BEIS) is merely the latest twist in a complex story of departmental reorganisation around formal industrial policy responsibilities. It is welcome, for instance, that BEIS has incorporated energy policy; yet, given their importance to a successful industrial strategy, it has rather absurdly surrendered both trade and higher education from the remit of its predecessor department. Secondly, industrial policy bodies within Whitehall have also been characterised by an endogenous weakness - they are too remote from actual economic life, and often focused on existing firms or existing markets rather than on developing a long-term strategy. These weaknesses are part of the reason why the UK has many industrial policies, but no real industrial strategy.

While we welcome the recent work of BEIS on renewing the UK's industrial strategy, there is as yet no reason to believe that, as an institution, the department rectifies this weakness. There are understandable concerns about the capacity of BEIS to deliver an industrial strategy; even if it held the necessary functions, industrial strategy cannot be the responsibility of a single Whitehall department. It needs to become an issue that the Prime Minister and Chancellor of the Exchequer are themselves responsible for and judged upon. As the two most powerful figures in a government they should be seen to 'own' and drive industrial strategy. Industrial strategy requires a new institutional champion, but it should sit within, not outside, the scope of 10 Downing Street and HM Treasury. It must work to enhance and co-ordinate the industrial policy capacity of all departments and relevant non-departmental public bodies, including in the devolved administrations, local government and the emerging regional tiers of government.

Industrial strategy at the heart of government

Public institutions are more than simply organs for making or delivering policy. Institutions enable policy learning through institutional memory, and offer a forum for coalition-building and trade-offs so that ideas can be translated into actual practice. Institutions should be robust against the short-termist pace of political life, enabling the establishment of policy agendas which endure across several administrations (vital for a successful industrial strategy) - one of the problems with departmental reorganisations around industrial policy is that it has left the process of institutionalisation 'incomplete'.[24] Institutions are also vital to ensure appropriate forms of accountability, since they clearly demarcate where responsibility for policy failures and successes rests.

For this reason, to deliver the kind of industrial strategy outlined in this report, the institutions responsible for the strategy must sit at the heart of government. At the same time, governments must be able to balance consistency and stability against responsiveness and flexibility - which will include acknowledging failures and closing programmes. We believe that ensuring democratically elected and highly visible politicians are ultimately responsible for the performance of industrial policy institutions is the best way to strike this balance.

[24] Berry, C. (2016) 'Industrial policy change in the post-crisis British economy: policy innovation in an incomplete institutional and ideational environment', *British Journal of Politics and International Relations*, 18(4), 829-847.

It is essential to note, however, that, despite the creation of BEIS, most of the policy areas most important to an industrial strategy are already the responsibility of HM Treasury. As well as controlling the spending of all other departments, the Treasury remains directly responsible for policies related to the banking sector, infrastructure, taxation and devolution. The UK's productivity strategy is also owned by the Treasury.

The problem is not that such powers are centralised within Whitehall in the Treasury; rather, the problem is the Treasury itself. Its high turnover of staff (internally and externally) may suit Whitehall rhythms, but is not conducive to the ownership of a long-term industrial strategy. Furthermore, while it is important that responsibility for industrial strategy lies with an all-powerful economics ministry, the Treasury's key statutory responsibility is to ensure the probity of public finances rather than on devising a sustainable developmental model for the economy. Among other things, it makes the department risk-averse (a characteristic which in turn influences the rest of Whitehall).

As a recent speech by HM Treasury's former second permanent secretary, John Kingman, made clear, the supply-side powers that the department has accumulated have typically not been exercised in a strategic, co-ordinated manner.[25] But this was not always the case. The Treasury's landmark 1961 report *Economic Growth and National Efficiency* led directly to the establishment of the National Economic Development Council (NEDC, or 'Neddy'). The NEDC became associated with failed industrial interventions in the 1970s, however, and was thoroughly marginalised before being finally abolished in 1992. But this example demonstrates the capacity for the Treasury to evolve. It is hard to imagine the department relinquishing the powers it has, so the focus must be on ensuring they are exercised in the correct manner by incentivising riskier, disruptive and long-term investments, genuine decentralisation, and co-ordination across all policy areas relevant to industrial strategy. Industrial policy needs specific organs for formulation and delivery, but the industrial strategy must be embedded in all government functions.

Independent monitoring

Many experts believe that the development and co-ordination of industrial strategy should be depoliticised, understandably identifying the electoral cycle as a barrier to a long-termist approach. The question is how would an independent body, equivalent to, say, the Office for Budget Responsibility (OBR) exercise genuine influence over a range of departments headed by cabinet ministers? The lesson of the NEDC is that the risk of capture or drift, or both, would be high. There is, however, a need for independent monitoring (and reporting to Parliament) of progress towards industrial strategy objectives. For this role the case for a new independent institution - very much like the OBR's role in relation to fiscal policy - is strong. This body could establish its own evidence base and, crucially, metrics on what a successful industrial strategy looks like. This would complement rather than displace the government's industrial policy capabilities.

Supporting business

One further obvious institutional reform we believe should be made concerns the provision of management advice to businesses. A point frequently made in submissions to the Commission was that there were too many governments schemes of various kinds focused on supporting business. Drawing upon evidence of the success of Enterprise Ireland, it is clear that these should be rationalised as part of an industrial strategy. There is a question, more relevant to the UK than in the Irish case, of whether a single agency should be made responsible for delivering

[25] Kingman, J. (2016) 'The Treasury and the supply side', speech delivered on 20 October https://www.scribd.com/document/328294000/Kingman-Speech.

business advice with the aim of improving management quality, or whether it should operate regionally rather than nationally.

Strong institutions beyond Whitehall

The institutional framework required for a successful industrial strategy will not begin and end in Whitehall. By necessity - and certainly to enable a strategy supporting economic development in all parts of the country - robust local institutions will be required. At present, with local authorities in England focused on social policy, only Local Enterprise Partnerships (LEPs), generally organised by city region, have any substantive role in industrial policy at the local level in England. However, while LEPs have some positive elements and achievements - particularly the way they seek to tie key employers and non-governmental stakeholders into a coherent local economic plan - overall they are rather toothless, under-resourced, and geographically incongruous. Regional Development Agencies (RDAs) may not have been perfect, in particular sharing with LEPs a lack of direct democratic accountability, but there has been loss of strong sub-national institutional capacity occasioned by their abolition.

Most countries with a strong industrial strategy tradition have economic policy levers at levels of political authority below the central government as a matter of routine. The United States, for instance, as a highly decentralised polity, has much more robust industrial strategy institutions at state level than is often appreciated. In fact, within the UK, the devolved administrations in Scotland and Wales have arguably built strongly upon the industrial policy powers decentralised in the 1990s; in a formal sense, these powers were broadly equivalent to those of the English RDAs, but the political structure of the Scottish and Welsh governments has clearly enabled better co-ordination with other policy functions.[26] This report is not the appropriate place to discuss democratic mechanisms, but it does appear that the piecemeal adoption (to date) of metro-mayors offers the UK an opportunity in the regard. The new mayoral offices need to be equipped with the resources - informational as well as financial - and authority to shape local economic development.

Of course, we should not assume that a place-sensitive industrial strategy can be delivered only by local *places*. One of the dangers of the metro-mayor model is that it represents a dilution of the link between local and national government, and indeed risks encouraging city regions to compete with each other in a destructive manner. A more robust institutional framework for industrial strategy at the national level should be seen as enhancing the capacity of local authorities to deliver the strategy at the local level, and establish different levels of spatial organisation for different types of economic policy powers.

Finally, just as the institutional framework needed does not begin and end in Whitehall, nor does it begin and end with formal political institutions. Longstanding institutions heavily involved in economic development, such as universities and the BBC, which play a vital role in mediating between the public and private sectors, should be supported - and new institutions able to perform similar functions with a specifically local mandate should be central to a new industrial strategy framework. It will also be enormously beneficial to industrial strategy if private sector institutions such as trade bodies took on a more substantive role in developing and delivering industrial strategy.

[26] The same potential exists in Northern Ireland to exercise well-coordinated industrial policy powers through its power-sharing executive.

Conclusion

A new institutional framework would place industrial strategy at the heart of government, owned by 10 Downing Street and HM Treasury. It must ensure the robustness and stability of institutions, while enabling responsiveness to changing circumstances. The Whitehall machinery should be supplemented by strong industrial strategy institutions at the local and regional level, and by co-operation with other public and private sector institutions. An OBR-style monitoring body is needed to hold policy-makers accountable for the success of the strategy and particular initiatives, devising its own metrics and establishing an evidence base.

Place

The new strategy should build on the existing strengths of local economies around the whole of the UK. This will be essential to improve national productivity performance; the divergence between London and the rest of the UK is already so extreme that London alone cannot improve the average. A better national productivity performance would improve the resilience of the economy to potential economic shocks ahead; as weak economies require higher public spending and produce less tax revenue, the best hope of achieving deficit and debt reduction targets lies in raising growth potential in such areas.

Implementing a strategy mindful of the geography of the economy will require a change of mindset (as well as institutions) in the UK's highly centralised state. Devolution to the nations and English city regions has started the process. Further decision-making and, potentially, financial powers will need to be devolved, although the framework of governance and accountability for doing so needs careful thought - and is a question on which we would welcome further views. What is without question is that policy needs to be significantly more decentralised, which would also help improve implementation, the Achilles heel of government economic interventions in the past. The Office of National Statistics' programme of work to improve the geographic granularity and timeliness of its statistics for all the devolved polities must also be sustained. The inadequacy of sub-national data is a telling sign of the past invisibility of the regions to the centre: official statistics are by definition what the state wants to see.

Economic activity is not evenly spread but concentrates in cities, or specific clusters, due to powerful agglomeration economies. Geographical clusters create a strong endowment of skills and connections. It is important not to be too simplistic about clusters: not all cities can have a high tech or biotech cluster, and not all clusters are based in cities, as some grow for serendipitous reasons and others - such as high value manufacturing - need a good deal of space. Agglomeration will also operate differently in different places depending on their mix of amenities, skills and locational specifics. Successful policies need to work with the grain of geography and history, and different policies will be needed for different places.[27] Industrial strategy therefore involves government choices about place as well as about sector or technology.

Politicians are often tempted to spread government interventions too thinly, ignoring the importance of agglomeration economies for success, thereby wasting public money. A past example is selecting different cities for different parts of the civil service being moved out of London, diluting the know-how and career flexibility that would have made them more attractive jobs and genuinely helped the economy of one location. A current example is the debate about whether to relocate Channel 4 from London to Birmingham, Manchester or elsewhere; the economic arguments point decisively to the Manchester region, already the biggest media cluster outside the capital.

However, although it is important to guard against dispersing what might otherwise become strong agglomerations, it is equally important to consider the areas outside major urban centres, including seaside towns, former coalfield districts, rural areas and the depressed hinterlands of big cities. Industrial strategy is distinct from an inclusive growth agenda, and long-term innovation and productive growth should stay the focus of strategic choices. But there may be times when, in a trade-off between economic efficiency and equitable treatment of communities, it is reasonable for the fairness objective to predominate. For example, 'left

[27] Centre for Cities (2017) *Why don't we see growth up and down the country?* http://www.centreforcities.org/wp-content/uploads/2017/04/17-06-20-Why-dont-we-see-growth-up-and-down-the-country-3.pdf

behind' places all need key basic infrastructure, and such investments may trump others that promise a higher economic return. What's more, many places outside the centres of the core cities may be able to grow out from nascent clusters. Examples would be Stoke-on-Trent's developing arts community, or the successful Advanced Manufacturing Research Centre (AMRC), which straddles the Rotherham/Sheffield boundary in the Sheffield City Region.

Agglomeration

The principal reasons agglomeration economies exist are:

- Knowledge spillovers occur more often where there are more people - they can share know-how and new ideas;
- People are more likely to have a range of job options or be able to switch jobs, especially if they have specialised skills - the labour markets are 'thick';
- Once the agglomeration process starts, the biggest markets are where the most people are to be found. This encourages more business growth;
- Similarly, supply chains develop and amenities are built which attract even more workers and employers.

There is a self-fulfilling dynamic at work. Although new cities do grow, this is often due to a physical advantage (such as a port or nearby natural resources) or perhaps a substantial government investment (such as a new administrative capital). On the whole, past agglomeration fuels future urban growth due to the increasing returns to density.

This dynamic has been reinforced by information and communication technologies. In the modern knowledge-based economy, the value of hard to codify know-how has increased, and the digital technologies have proven to be complements to face-to-face communication (not substitutes for it, as early advocates of the 'death of distance' argued).[28] So clustering in cities in high tech sectors, but also all information-intensive sectors such as finance and professional services, has increased.

The limits are congestion effects such as costly housing, long commutes, and the disamenities of crowding or pollution. These negative agglomeration effects for households limit the positive agglomeration effects in production. But while the balance of economic incentives determines city size in a given context, changes in the context (such as technology, transport investments, housebuilding) can have a significant impact. It is clear that in general people put a high value indeed on proximity.

All economies have just a small number of very large, productive, diverse city regions. The UK is unique in the OECD having only one. So the UK economy hits the congestion buffers quickly. There have been several episodes of post-war policy tightening when this was the last thing needed in some parts of the country. Social welfare for the UK as a whole would be higher if London's congestion costs could be diminished as a result of greater capacity to grow a second or third global urban region. The UK has several candidate regions and a strategic challenge is how to get these to critical mass for a powerful agglomeration dynamic to begin. A more even regional distribution of productive activity and well-paid, skilled jobs is also desirable in itself.

[28] Glaeser, E. (2011). *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. Macmillan: Basingstoke and Oxford.

How has the UK come to be so 'unbalanced' relative to other advanced economies? Apart from the inherent self-reinforcing 'Matthew effect'[29], in economic growth of rich places getting richer, a number of factors have contributed:

- The limitation of standard evaluations of government interventions such as infrastructure investment and spending on public sector R&D;
- Zero sum mentality;
- Political and administrative centralisation.

Methods of evaluation for public sector investments

In principle, potential public sector investments should be thoroughly appraised. In practice, current methods amplify the inherent self-reinforcing dynamic of agglomeration.

Formal appraisals looking at costs and benefits projected into the future apply a methodology designed for marginal and linear changes to investments that are intended to bring about non-linear or non-incremental change. For example, a big infrastructure project whose aim is to bring about economic development involving changes in commuting patterns or the location of certain supply chains would be under-valued by standard cost-benefit analysis methodologies. Although such future benefits are more uncertain than incremental changes, they have a strongly self-fulfilling character. The errors in appraisals from applying the standard methodology to non-linear contexts can be large, both because relative prices may change and because large projects can have large effects on aggregate economic output.[30]

There is no definitive guidance about when the linear approach to a project appraisal will be misleading. However, context is clearly relevant to the likelihood of significant changes in relative prices or aggregate consumption. For example, upgrading rail links to better connect cities and towns across northern England in a single labour market by reducing commuting times is an obvious example of investment with potentially non-incremental outcomes, whereas upgrades to existing commuter lines into London, with a dense existing network of different commuting options, are incremental.

The existing methodologies do not systematically capture externalities and spillovers either, although some progress has been made in trying to assess 'wider economic benefits'. This includes agglomeration effects; output changes in imperfectly competitive markets; impacts on labour supply; and change in the productivity of jobs.[31] The last two of these are valued in terms of the additional tax revenues due to the change in labour supply - a point taken up below. Although there has been extensive research on this area in recent years, there is not yet settled doctrine. However, the key point is that the focus of appraisal should be the potential for economic development over time, not the narrow net benefits of a single project.[32]

---

[29] The 'Matthew effect' was coined by Robert K Merton in 1968 and refers to the parable of the talents in the Gospel of Matthew (25:29) in the New Testament: *'For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken even that which he hath.'*

[30] Dietz, S. and Hepburn, C. (2013) 'Benefit-cost analysis of non-marginal climate and energy projects' *Energy Economics*, 40, 61-71; The errors arise from the curvature of the utility function, which for ranges which are empirically plausible, makes the linear first order Taylor expansion for the stream of future utilities a poor approximation. The elasticity of the utility function depends on preferences for inter-temporal substitution, aversion to risk, and aversion to (spatial) inequality.

[31] Department for Transport (2005) *Transport, Wider Economic Benefits and Impact on GDP*. Discussion Paper http://webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/pgr/economics/rdg/webia/webmethodology/sportwidereconomicbenefi3137.pdf

[32] Metz, D. (2016). *Travel Fast or Smart? A Manifesto for an Intelligent Transport Policy*. London Publishing Partnership: London.

A final crucial point about methodology is the standard approach to the valuation of potential benefits, which uses prevailing market prices, such as existing wage rates and the tax revenues they are likely to generate, or current house prices. However, the value of time saved thanks to, say, a faster train journey between Sheffield and Manchester at prevailing wage rates will be lower than its value at wage rates in new, higher productivity equilibrium. Moreover, using current market rates exacerbates even further the self-reinforcing divergence described above.

Zero sum mentality

Much of the debate about regional imbalances within the UK frames it in terms of 'rebalancing'. This speaks to a zero sum mentality about the geographical distribution of economic activity, as if other regions can only grow faster or become more productive at the expense of London, whose growth would have to be constrained. But on the contrary, if one or two other regions also generated faster and higher productivity growth, congestion effects - the agglomeration disamenities - would be reduced in London, and the economy as a whole would be able to grow faster without policy action to prevent overheating. Having more than one economic engine would benefit the whole of the UK.

The one area where zero sum considerations obviously do apply is in the allocation of limited public sector funds for investment. However, better appraisal methodologies would help to develop a systematic approach to the allocation of funds.

Centralisation

As noted in Part One, the UK economy and polity is highly centralised relative to its peers. There are a number of areas where policy could help the attainment of critical mass in other cities apart from London:

- Some transport investments will have the potential to turn a wider urban area into a single commuting area. The appraisal of such projects ought to take into account potentially large changes in behaviour;
- Any other significant public sector investments should be appraised as non-incremental projects;
- It is essential to think about agglomeration effects when considering public sector investments and relocations. One implication noted above is to ensure similar activities are clustered;
- Further devolution of skills policy, as central government officials do not have the granularity of local knowledge to understand local skill needs. For schools, the successful London Challenge needs to be replicated around the country.

Conclusion

The UK's economic performance will not improve without productivity improvements in parts of the country other than London and the South East - not zero sum 'rebalancing', but improving growth and productivity elsewhere. The UK is an unusually centralised nation among its comparators, so this will require continuing devolution of decision-making powers.

Agglomeration economies are a powerful force concentrating economic activity in cities. Government policies need to recognise this reality and aim to focus on clusters of high productivity activity. This is not to overlook the need for adequate investment in second tier or poorer places, often missing, when there is a trade-off with economic efficiency.

However, agglomeration occurs within contexts shaped by government. The current methods of appraising public investments such as infrastructure make the disproportionate role of London self-fulfilling. They do not take account of possible step changes in productivity due to interventions in weaker parts of the economy, and because using current market signals (such as wages or house prices) to assess future benefits creates a winner-takes-all dynamic.

Science, research and innovation

The UK is a significantly less research-intensive economy - as measured by the share of GDP devoted to research and development (R&D) - than either its traditional competitors in the developed world, or the fast growing economies of East Asia. Moreover, UK spending on R&D - both public and private - is highly regionally polarised toward London and the South East.

There is now consensus that the nation should become more R&D intensive; the Conservative Party and Labour Party manifestos at the 2017 general election supported a target for an increased R&D intensity, both aspiring to a target of 3% of GDP.[33] This target is also supported by organisations such as the CBI and the Royal Society.

It is not obvious, a priori, what the ideal proportion of GDP that should be spent on R&D is - it would in principle be possible to overinvest. The optimum level depends on the structure of the economy and its sources of comparative advantage (though equally it may be research capacity that dictates where comparative advantage can be found). Nonetheless, there seems little doubt that the UK's current level of investment is too low.

But it is important to understand who funds and carries out R&D. The larger part of research and development is carried out by the private sector, and in the short-term this is most likely to yield increases in productivity through the introduction of new products and improved processes. The UK's low level of *business* R&D is likely to be linked most directly to poor productivity performance nationally and regionally. A target of overall R&D intensity of 3% of GDP can only be met if there are substantial increases in expenditure on R&D by the private sector.

Economic theory predicts underinvestment in R&D by firms, as they are unable to capture the full benefits of their investment. This market failure, and the beneficial spillovers of business R&D to the wider economy, justifies subsidies to the private sector to carry out R&D. In the UK, R&D tax credits amount to a substantial, but untargeted, degree of public sector support.

However, levels of business R&D are closely linked to government support for R&D. The R&D supported by the government is a public good, supplying skilled people, new knowledge, and connectivity to global knowledge networks, which business R&D can exploit; and it 'crowds in' private spending. Thus the UK's low business R&D intensity is partly explained by low levels of government support for research.[34]

The different roles of the public and private sectors in supporting R&D, and the crucial importance of having strong links between them, stresses the importance of having the right institutional framework for the government's support of science and innovation. This framework needs to recognise that, in the context of industrial strategy, science and innovation policy has to balance three goals:

- support for the existing business base to make the most of new technology (for example, in much more widespread use of digital technologies, automation and robotics in manufacturing);
- the development of new technologies that may be the basis of new industries (for example in machine learning, nanotechnology, biotechnology and quantum technology);

[33] Labour committed to 3% by 2030, the Conservatives to 2.4% in 10 years with 3% as a longer term goal.

[34] Economic Insight Ltd (2015) 'What is the relationship between public and private investment in R&D?', report for the Department of Business, Innovation and Skills https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf

- support for the creativity of outstanding individual scientists and groups, as they explore new fields whose potential impact is entirely unpredictable.

UK Research and Innovation (UKRI)

The institutional landscape for publicly funded research is being reorganised, through the establishment of UK Research and Innovation. This single non-departmental public body, established in the Higher Education and Research Act 2017, will incorporate the seven existing research councils, which provide project funding to (predominantly) university-based research and that part of the Higher Education Funding Council for England (HEFCE) which provides block funding in support of research and knowledge transfer to English universities (this function remaining devolved to national bodies in Wales, Scotland and Northern Ireland). UKRI also incorporates InnovateUK, a 'business led' organisation which provides collaborative grants to business, and in addition operates a relatively newly established network of translational research centres, the Catapult Centres.

The guiding principles for the new organisation are laid out in the Nurse Review (2015), which is heavily focused on the research councils and criteria of 'scientific excellence' as defined by peer review.[35] There is a strong emphasis on UKRI as a strategic link between the science base and government operating in two directions - as a single voice for science to government, and as a conduit from government to better align research strategy with government priorities.

The Nurse Review said little about the relationship between research councils and InnovateUK in the new UKRI environment. The organisations should work towards a common strategy, and co-operate more closely at an operational level. But it would be a mistake to treat InnovateUK as the single intermediary between the research base and business - that would be imposing a wholly inappropriate linear model on a system that already benefits from many links at many levels between researchers, businesses and funding bodies.

Place

Previous science and innovation policy (in England, at least) has tended to resist any consideration of geography in its decision-making, focusing solely on 'excellence'. The current deeply geographically unbalanced research landscape is a consequence of a combination of deep history (i.e. the location of England's two ancient universities), policy decisions on siting major facilities in the 'Golden Triangle' (e.g. the Diamond Light Source and the Francis Crick Institute for biomedical research), a conscious policy of research concentration, and the natural tendency of strong research centres to attract further funding and outstanding researchers from around the world (another example of the Matthew effect described above).

The Nurse Review concedes that location could become a consideration in new investment decisions, if a place-based investment would either build on existing strength in an area, or fill some gap in national capacity where there was no pre-existing centre. Existing regional strengths could be mapped by a process building on the Science and Innovation Audits that the government has recently sponsored; this should be part of the larger task of identifying the areas of comparative advantage that exist in cities and regions.[36]

[35] Nurse, P. (2015) *Ensuring a successful UK research endeavour: a review of the UK research councils* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478125/BIS-15-625-ensuring-a-successful-UK-research-endeavour.pdf

[36] Department for Business, Energy and Industrial Strategy (2016), Science and innovation audits: first wave reports https://www.gov.uk/government/publications/science-and-innovation-audits-first-wave-reports

This mapping process is important, but it will not be enough by itself to make a difference to what is a major structural issue. This will need both new place-based delivery mechanisms for research funding, and new research institutions located in weaker regions. This will require more clarity about the roles of different kinds of research institutions in the context of wider regional and national innovation systems than we have seen so far.

Institutions for Research and Development

Research and development takes place in different kinds of institutions, which differ in their missions and roles within an overall national innovation system. Some examples of these different types of institution include:

1. **Universities**. Here research, often but not always basic in character, driven by disciplinary/academic priorities, is carried out, usually with support from research councils, in parallel with undergraduate and postgraduate teaching.
2. **Publicly supported basic research institutes.** Research driven by disciplinary/academic priorities, largely government supported. E.g. Max Planck Institutes in Germany, the Francis Crick Institute (UK).
3. **Public sector research establishments (Civil)**. Research directly supported by government driven by non-defence state priorities. E.g. Health and Safety Laboratory, Meteorological Office, National Institute for Standards and Technology (USA).
4. **Public sector research establishments (Defence)**. Research directly supported by government in support of defence (though often with an aspiration to create marketable civil technologies as spin-offs). E.g. Los Alamos National Laboratory (USA), Defence Science and Technology Laboratory, Porton Down (UK).
5. **Public sector translational research institutes, with strong private sector partnerships.** Government run laboratories with a primary mission to support innovation in the private sector. E.g. ITRI (Taiwan), Fraunhofer Institutes (Germany).
6. **Private sector contract research organisations.** Private sector (including not-for-profit) laboratories dependent on R&D contracts from both the public and private sectors. E.g. SRI International (USA), Battelle Memorial Institute (USA).
7. **Corporate research laboratories carrying out strategic/long-ranged research.** Laboratories supported by large companies carrying out long-ranged, speculative research. E.g. Bell Laboratories (pre 1996, USA), Google X Laboratory (USA).
8. **Product focused company R&D laboratories.** Private sector R&D focused on existing or planned products and services, including both large companies and spin-outs.

The first two categories of academic research have the highest visibility, but most R&D is done in institutions in the other categories. The balance between different types of institutions can vary over time and between different countries. For most of the post-war era, R&D in the UK was dominated by defence public sector research establishments (PSREs) and corporate laboratories.[37] Since 1980 these have been reduced greatly in importance as a result of changes in government policy (including the privatisation of some PSREs) and corporate governance[38], and university-based research has come to occupy a position which is proportionately larger than in most other research-intensive countries.

[37] Edgerton, D. (2005) *Warfare State: Britain, 1920–1970*. Cambridge: Cambridge University Press.

[38] Jones, R.A.L. (2013) 'The UK's Innovation Deficit & How to Repair it' *SPERI Paper No.6* http://speri.dept.shef.ac.uk/wp-content/uploads/2013/10/SPERI-Paper-No.6-The-UKs-Innovation-Deficit-and-How-to-Repair-it-PDF-1131KB.pdf

Recent years have seen a number of changes in the institutional landscape in the UK. A series of translational research institutes - the Catapult Centres - have been founded, on the explicit model of Germany's Fraunhofer Centres. Other recent new government supported research institutions include the National Graphene Institute, the Alan Turing Institute, the Francis Crick Institute, the Sir Henry Royce Institute and the Rosalind Franklin Institute. The Government's 2017 Green Paper suggested another centre, for battery research.

The Francis Crick Institute is unambiguously in the second category, as a centre of academically driven life sciences. The role of the other centres is not always so well defined. For these centres, and for any future institutions that may be created, there should be greater clarity about the role and mission of each in the context of the wider innovation system.

For each institution there needs to be an understanding of where it sits on the spectrum from basic research to translation, and how success is to be judged - for example, whether by international scientific reputation and publication of high-impact outputs, by assistance given to established technology-intensive companies, by technology diffusion amongst less technology-intensive firms, or by the production of de-risked and investable propositions for spinning out and receiving venture capital funding. There must be a clear understanding of the appropriate business model for each institution, balancing any obligation to earn a commercial return (e.g. from commercial contracts and intellectual property licensing) with the degree to which they support open innovation.

As well as clarity about the role of each individual institution, a view needs to be taken about the evolution of the developing innovation landscape as a whole, with particular attention being paid not just to the individual institutions, but to the relationships between the different parts - including relationships with university research, business research, and venture capital funded spin-outs.

Since physical research institutes are by their nature located in distinct places, it will be important to understand the role these institutes can have as nodes or anchors of regional innovation ecosystems, supporting economic growth by attracting inward investment, attracting talented people from outside and developing the skills of local people, and encouraging private sector innovation activity.

New delivery mechanisms

In addition to new institutions, there is now interest in new delivery mechanisms for research funding. In particular, the new Industrial Strategy Challenge Fund (ISCF) has the potential to create new ways of initiating and funding fruitful public-private sector partnerships to develop research in support of the strategic goals of the state.

As always, there is a temptation to look abroad for models to emulate, and there has been much interest in the USA's Defense Advanced Research Projects Agency (DARPA). We caution that the success of DARPA in certain specific areas of innovation (the Internet and GPS) may not be easily replicated in the UK's environment, with its different innovation ecosystem.

DARPA's success is related to the clarity of its strategic mission - the requirement to maintain the absolute technological superiority of the US Armed Forces. The technologies often ascribed to it were only developed with substantial additional effort - particularly at the development end of R&D - by other agents, especially private sector R&D.

Nonetheless, there are lessons to be learnt here; about the need for able and strongly empowered programme managers, the importance of private sector contract research organisations, and above all the focus on challenge-led research. The task will be to identify challenge areas with a high degree of focus and alignment with the UK's big strategic goals.

Research and skills

The strength of the research base and the wider skills agenda are seldom considered together, a damaging error. The existing split between higher education and further education has been harmful; the increasing involvement of universities - including research intensive universities - with intermediate level skills, including apprenticeships, should be welcomed and supported.[39] There is now the danger of a new split between teaching and research in English universities as responsibilities previously held by HEFCE are split between the Office for Students and Research England. This needs to be mitigated, while the involvement of research councils with the skills agenda at the PhD level should be further supported, building on their existing strong networks with industry. The most effective mechanism for knowledge transfer and the diffusion of technology is the movement of skilled people at all levels.

Conclusion

The R&D intensity of the UK is too low and a key aim of industrial strategy should be to correct this. This needs to be done in a way that considers the whole innovation landscape, including both public and private sectors, and the whole spectrum from basic to translational research.

The most pressing issue, in terms of likely immediate impact on productivity, is to increase business R&D and the translational R&D which supports strategic government goals in areas such as energy and healthcare. This is likely to involve new institutions and new partnerships between the public and private sectors.

To achieve success over the long-term, there needs to be a correct balance of support for unfettered discovery research of the highest quality, research to support existing business and government priorities, and the development and commercialisation of new technologies to create new companies and new industries.

The gross regional disparities in public and private R&D intensities need be remedied by a systematic approach which analyses regional innovation ecosystems, develops anchor institutions appropriate for the existing strengths and realistic future potential of city and regional economies and simultaneously improves the innovation capacity and skills base of currently underperforming areas.

[39] Burnett, K. and Thrift, N. (2015) *The Future of Higher Vocational Education* https://www.sheffield.ac.uk/polopoly_fs/1.447717!/file/REPORT.pdf

Competition policy

A robust competition policy is a vital component of industrial strategy. Ensuring that innovators do not face prohibitive barriers to entry or expansion, and preventing incumbents from exploiting policies to enhance their own market position, will help avoid the risk of 'picking winners' among incumbents. The UK will need to implement its own state aid policy outside the EU, through the Competition and Markets Authority (CMA). Any proposals for support to individual sectors - which are always defined in terms of incumbents - should be strictly time limited with sunset clauses.

A strategic approach to competition and mergers

Competition policy also needs to become more strategic, in the context of both a strategic economic framework and significant technological innovation. Merger control has over time become technical and incremental. The decision-making process needs to allow space to consider significant markets in a more strategic way. A good example would be the decisions taken with regard to telecoms markets in recent years, which were split between Ofcom and the CMA, and assessed individual mergers without consideration of the longer-term evolution of the market.

However, although a longer-term horizon in key markets is desirable, it would be a highly retrograde step to reintroduce any criteria other than competition into competition policy. The decision in 2008 to extend the list of public interest areas where ministers can intervene to include financial services, to enable the takeover of HBOS by Lloyds, was regrettable. Outside national security and media plurality - areas where other considerations must sometimes take precedence - competition policy is the wrong tool for addressing other, unrelated, public interest aims.

Regulation and consumer policy

In addition to merger control and market inquiries, regulation has important competition consequences, and the UK regulatory landscape is unsatisfactory. It is vulnerable to frequent political interventions. The sector regulators governing the former natural monopoly nationalised industries are vulnerable to regulatory capture. Most of the sectors governed by these regulators have among the most dismal productivity records in the economy. These sector-focused bodies should be replaced with a horizontal regulator - especially as the market and technological landscape is changing in many of these sectors. The exceptions may again be media and financial services, where questions of plurality on the one hand and financial stability aims on the other pose different challenges. We will return to this in our final report and would be interested in comments on this issue.

Regulation is failing to serve the interests of consumers. Consumer policy has no strategic home - for example, there is no entity giving serious thought across the board to data security and privacy questions. Consumer policy should be restored as a function of the CMA, along with regulatory questions. This would enable joined-up long-term thinking about the consequences of regulatory reforms to help markets work better, and what accompanying policies might compensate the losers from regulatory reform. Competition and consumer protection should go hand in hand, to the benefit of both.

An expanded remit for the CMA

Other strategic aims that could potentially be located in the CMA include standard setting questions (as open or readily-licensed standards are so fundamental to the competitive functioning of markets), intellectual property questions (as IP protection is a temporary grant

of monopoly power), and government procurement policy. Government spends billions of pounds on research but invests nothing in market creation through its own demand - for instance, using the NHS as a customer for health innovations.

Conclusion

A strong competition and state aid regime is an essential component of industrial strategy, to enable innovation, new entry and structural change. Competition policy, regulatory functions and consumer policy need to be joined up, potentially in the CMA, to bring a strategic perspective to policy and to tackle the regulatory capture and disappointing productivity performance in some key sectors of the economy.

Investment

The UK's low investment rate is a factor in its sluggish productivity performance, with business investment in particular trailing behind most other G7 countries and expected to decline further in the short-term.[40] This does not mean there is a straightforward remedy – and it is not the job of an industrial strategy to determine how and where private enterprises should invest. However, it is clear that the sustainable development of any capitalist economy depends upon plentiful capital, invested efficiently in productive and innovative activities. Industrial strategy is legitimately concerned with ensuring that private investment is aligned with the public interest, as far as possible. It should be concerned with both the volume and composition of investment. For the most part, this means ensuring that the economy houses and supports multiple sources of financing for productive activity. One of the most important lessons arising from the UK's recent experience is that relying too heavily on a small number of sources of business finance - including public finance - undermines the resilience of the economy.

The public sector clearly has an important role to play. We believe a higher level of capital investment by the public sector will be necessary. More importantly, however, public investment needs to be undertaken more strategically. It should be geared towards maximising opportunities to unlock private investment and improve the productivity of the firms, industries and local economies to which it is directed. Greater *stability* of public investment - especially in relation to local economies - is key. The evidence is particularly strong in this regard for private R&D investment.[41]

The banking sector

The activities of the banking sector are often associated with the 'unbalanced' nature of the UK economy; many argue, as a consequence, that banking reform is central to reorienting the UK economy towards long-term, productive investment. The lending activities of the UK banking sector are a legitimate focus for an industrial strategy, not least due to the dependence on small and medium-sized enterprises (SMEs) on bank finance (about one in five have a bank loan). The Competition and Markets Authority 2016 report on retail banking reported that the market for SME lending is highly concentrated and described the pricing of loans as 'opaque' and 'complex'.[42] Bank loans seem unlikely to be a good source of finance to grow small businesses.

It is clear, furthermore, that UK bank lending is heavily focused on residential property, and that the banking sector's head office concentration in London may be inhibiting its ability to appreciate the potential for high growth in industrial activities elsewhere. Data from the Federation of Small Businesses shows that SMEs based outside London are more likely to

[40] Analysis of Gross Fixed Capital Formation data from the World Bank (available at http://data.worldbank.org/indicator/NE.GDI.FTOT.ZS) and OECD data on investment by sector (available at https://data.oecd.org/gdp/investment-by-sector.htm) shows that Italy had the lowest share of business investment across the G7 in 2015 at 8.9% of GDP followed by the UK at 9.4% of GDP. Expectations of further decline have been reported by PwC (see: https://www.pwc.co.uk/economic-services/ukeo/pwc-uk-economic-outlook-full-report-march-2017-v2.pdf) and a *Financial Times*' survey of economists (see: https://www.ft.com/content/a0c3fce4-d0e2-11e6-b06b-680c49b4b4c0?mhq5j=e2).

[41] Department for Business, Innovation and Skills (2014) *Estimating the Effect of UK Direct Public Support for Innovation* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/369650/bis-14-1168-estimating-the-effect-of-uk-direct-public-support-for-innovation-bis-analysis-paper-number-04.pdf.

[42] Competition and Markets Authority (2016) *Retail Banking Market Investigation: Final Report* https://assets.publishing.service.gov.uk/media/57ac9667e5274a0f6c00007a/retail-banking-market-investigation-full-final-report.pdf.

have credit applications turned down – and indeed less likely to have sought credit in the first place.[43] It will be important to monitor whether the general move towards 'macroprudential' banking regulation exacerbates such dynamics in service of a financial stability agenda. Of course, while these characteristics may have deleterious systemic impacts on the UK economy, it does not mean that at the micro-level bank finance is problematic for most SMEs. And while UK banks may lack expertise in the most innovative high-value manufacturing firms, and are often unwilling to shoulder the uncertainties involved in disruptive innovation, bank finance will not necessarily be the most appropriate form of financing for such activities. As such, the Cameron government's interest in smaller 'challenger' banks is probably not going to be more than part of the answer for the financing of SMEs with high growth potential.

It is vital that firms with high growth potential are able to draw on a more diverse range of investors. There have been growing demands for the creation of public investment banks in the UK (especially in the context of the devolution of economic policy powers to local and regional authorities). Public investment banks operate along the lines of conventional banks, but are ultimately directed by their owner - public authorities - to prioritise lending to companies operating in the public interest. Most similar countries to the UK, and most emerging economies, have such institutions in some form. However, it is worth pointing out that most submissions to the Commission did *not* cite public investment banks as a central element of a successful industrial strategy.

We believe that further research is necessary to establish the merit of public investment banks in the UK, and would welcome further submissions, and indeed further pilot initiatives. A key issue will be whether the apparent success of public investment banks in other countries can be easily replicated in a different UK economic environment. The British Business Bank (BBB) established in 2014 (at a very small-scale, and with limited strategic goals beyond increasing access to finance for SMEs) was criticised along these lines. The BBB does not lend directly, but rather via third party lenders. Yet this model tends to work only where there are existing local banking networks with relationships with and intelligence on local firms. Direct distribution might be necessary in the UK, but also far riskier, and the model would therefore be difficult to scale up.

Venture capital

One form of investment where the state is already *more* active than is generally understood is venture capital, which is generally a more appropriate form of financing than bank finance for early-stage and technologically innovative firms. In 2015, the venture capital industry as a whole raised £286 million in funds from government sources (including the EU); this is on a similar scale to the total investment by venture capital in technology companies at early stage and expansion in that year - £321 million.[44] There are understandable concerns that the UK may have a lack of investors willing to engage in venture capital activities, and indeed a lack of investable opportunities (particularly in regions where public support for venture capital is most important; that is every region outside London and the South East[45]).

[43] Cox, E. & Schmuecker, K. (2013) *Beyond Big Banks and Big Government: Strategies for Local Authorities to Promote Investment*, Northern Economic Futures Commission, http://www.ippr.org/files/images/media/files/publication/2013/12/Beyond-Banks-Big-Govt_MAR2013_10545.pdf?noredirect=1.

[44] British Private Equity and Venture Capital Association (2016) *Private Equity and Venture Capital Report on Investment Activity 2015*, https://www.bvca.co.uk/Portals/0/library/documents/BVCA%20RIA%202015.pdf.

[45] Mason, C. and Pierrakis, Y (2013) 'Venture capital, the regions and public policy: the United Kingdom since the post-2000 technology crash', *Regional Studies* 47(7), 1156-1171.

However, defining the UK's venture capital conundrum as either a demand- or supply-side problem is insufficient; arguably, both sides of this equation are in reasonably good health, but poor interaction between supply and demand means the market is too 'thin' to be sustained without continuing government support. This underlines the importance of local and national institutions mediating between the public and private sectors in orienting capital markets towards the delivery of industrial strategy objectives.[46] Robust institutions mediating between supply and demand will help to smooth market frictions and encourage prolonged interaction between investors and potential investee companies.

Institutional investment

Institutional investment will also continue to be an important part of the UK's investment landscape, and we should consider ways to ensure long-term investments in productive and innovative activities form key parts of investment portfolios. Many governments have considered this issue, and the current government is no exception. But it is regrettable that the Patient Capital Review currently being undertaken by HM Treasury - focused on sources of long-term finance for innovative firms - is proceeding in isolation from the development of an industrial strategy.[47] From an industrial strategy perspective, capital is sometimes *too patient*, insofar as its concentration in small, risk-averse firms is a factor contributing to the UK's long tail of unproductive SMEs.

Previous government reviews in this area, notably the Kay Review of UK Equity Markets and Long-Term Decision Making (in 2012) and the Myners Review of Institutional Investment (in 2001) have focused on various elements of investment practice, recommending, respectively, stronger fiduciary duties and more emphasis on corporate stewardship within the asset management industry (albeit generally achieved via self-regulation).[48] Neither review, however, was sufficiently focused on the evolving nature of institutional investment (especially the changing characteristics of pension funds) and, failed to consider whether it was in the interests of the beneficial owners of funds to adopt longer-term investment strategies, as has been suggested.[49] Part of the job of an industrial strategy is to create the opportunities for long-term investment that coincide with the needs of institutional investors, and their policy holders and pensioners, and there are open questions here. It should of course be noted that overseas investors now play a substantial role in the UK institutional investment landscape, and indeed that UK investors will rightly allocate funds to overseas markets. There are limits to government action in this area, but a greater consideration of incentive structures for institutional investors would be welcome.

[46] Nightingale, P et al. (2009) *From Funding Gaps to Thin Markets: UK Government Support for Early-Stage Venture* Capital http://www.nesta.org.uk/publications/funding-gaps-thin-markets.

[47] Details of the Patient Capital Review are available at https://www.gov.uk/government/publications/patient-capital-review

[48] Kay, J. (2012) T*he Kay Review of UK Equity Markets and Long-Term Decision Making* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253454/bis-12-917-kay-review-of-equity-markets-final-report.pdf; Myners, P. (2001) *Institutional Investment in the United Kingdom: A Review*, available at http://uksif.org/wp-content/uploads/2012/12/MYNERS-P.-2001.-Institutional-Investment-in-the-United-Kingdom-A-Review.pdf

[49] Berry, C. (2014) 'Pension funds and the City in the UK's contradictory growth spurts', paper presented at CITYPERC/SPERI workshop 'Capital Divided? The City and the Future of the British Economy' https://www.academia.edu/9094932/Pension_funds_and_the_City_in_the_UKs_contradictory_growth_spurts.

Business investment

Compared to other countries, large UK companies under-invest in their productive capacity. UK private investment as a proportion of GDP has been lower than the rest of the G7 and OECD for most of the past 40 years.[50] The Bank of England estimated (in 2015) that private non-financial corporations were holding around £500 billion in cash[51], from financial surpluses maintained for around a decade from the early 2000s onwards. This accumulated cash will have been earmarked for a range of purposes, and was almost certainly an adjustment to the financial crisis. Nevertheless, it hints at a diversion of financial resources from investment, given the current reliance of business R&D investment on internal cash flows.[52]

A range of explanations for low investment are possible: each is likely to be correct to some degree for different firms. The services industries in the top ranks of the FTSE100 may be a key part of the explanation; companies in industries such as retail tend to be less capital-intense, and therefore have less need to recycle their profits. We can also see profit retention as a rational response to the 2008 financial crisis, as firms sought to reduce their dependence on bank finance. A reluctance to invest has only been reinforced by political and economic uncertainties, chiefly but not exclusively Brexit.[53]

There is no simple solution to this dilemma. Competition policy, discussed elsewhere in this report, along with corporate governance reforms, will be part of a suite of remedies, as they encourage long-termist business strategies across the private sector. The Commission received some evidence on corporate remuneration and employee representation on company boards. We have not yet reached a conclusion on these issues.[54] More generally, a stronger focus on supporting innovative firms, insofar as they will have stronger investment incentives, is likely to improve investment rates. Clearly, to address uncertainty, the adoption of an industrial strategy with a clear long-term direction of travel will be the most important remedy.

Conclusion

Greater diversity within the financial ecosystem is essential for a successful industrial strategy. The UK's investment rate is too low, and a key factor in explaining poor productivity performance. We believe the government should increase public investment, in a co-ordinated manner, and consider how to ensure that financial regulation is consistent with industrial strategy objectives where possible. There is no simple, singular solution to the dependence of venture capital on government support, or the reluctance of large firms to reinvest their profits; the adoption of a coherent, long-term industrial strategy will help, but issues such as these should be recognised as impediments to sustainable development and monitored as such.

---

[50] OECD (2015) *Economic Survey of the United Kingdom 2015* http://www.oecd.org/unitedkingdom/economic-survey-united-kingdom.htm

[51] Farrant, K. & Rutkowska, M. (2015) 'Are firms ever going to empty their war chests?', *Bank Underground*, 24 July, https://bankunderground.co.uk/2015/07/24/are-firms-ever-going-to-empty-their-war-chests/.

[52] Bank of England (2016) 'Understanding and measuring finance for productive investments', *Bank of England discussion paper* http://www.bankofengland.co.uk/financialstability/Documents/fsdiscussionpaper/080416.pdf; Jacobs, Michael et al. (2016) *Out of Shape: Taking the Pulse of the UK Economy*, IPPR.

[53] Broadbent, B. (2016) 'Uncertain times', speech delivered on 5 October, http://www.bankofengland.co.uk/publications/Documents/speeches/2016/speech929.pdf;

[54] For a useful discussion of these issues, see: Lawrence, M (2017) *Corporate Governance Reform: Turning businesses towards long-term success*, IPPR Commission on Economic Justice http://www.ippr.org/corporategovernancereform

Skills

Skills are an undisputed important part of the productivity story in the UK. As Chancellor, Gordon Brown identified skills as one of the 'five drivers' of productivity[55] while improving workforce skills formed one of 'ten pillars' set out in the Conservative Government's 2017 Green Paper on industrial strategy.[56] But this agreement that skills are important has not led to either consensus or consistency on how to achieve better skills or deploy them. A recent report from the Institute for Government described further education and skills reform as 'the worst failure of domestic British public policy since the Second World War'.[57] It concluded that the newly proposed 'T Levels' (recommended following a review led by Lord Sainsbury [58]) would represent the twenty-ninth major reform of vocational education since the early 1980s. In less than four decades, there have been 28 major pieces of legislation, 48 Secretaries of State with relevant responsibilities and no organisation focused on skills policy has survived longer than a decade.

Significant skills challenges

In basic skills, as stated in the Government's recent Green Paper, England is the only country in the OECD where 16 to 24-year olds are 'no more literate or numerate than 55-64 year olds'.[59] In 2011, 49% of adults had numeracy levels at or below those expected of an 11-year old, with 15% at or below this level for literacy. In 2011-12, 16-18 year olds were the worst performing on literacy and second worst for numeracy out of 18 OECD countries.[60]

The UK's technical education system is also very weak by international standards. Only 10% of 20-45 year olds hold technical education as their highest qualification, placing the UK 16th out of 20 OECD countries. By 2020, the UK is set to fall to 28th out of 32 OECD countries for intermediate (upper-secondary) skills. Comparatively we have a small and underperforming technical sector, largely underfunded, hardly noticed, and run in totally different and too often disconnected ways from either the higher education or school sectors that sit either side of it.

The need for stability

Frequent qualification reforms over recent years - from the Technical and Vocational Education Initiative (TVEI) and National Vocational Qualifications (NVQs) to 14-19 Diplomas and T Levels have been matched by significant and frequent institutional changes. Colleges of Advanced Technology, Polytechnics, Centres of Vocational Excellence, National Skills Academies and National Colleges are now proposed to be followed by Institutes of Technology, 'linked to leading universities, in every major city'.[61]

---

[55] HM Treasury (2000), *Productivity in the UK*: *The Evidence and the Government's Approach*, London, HM Treasury.

[56] Department for Business, Energy and Industrial Strategy, (2017) *Building our Industrial Strategy.*

[57] Norris, E. and Adam, R.(2017) *All Change: Why Britain is so prone to policy reinvention, and what can be done about it*, Institute for Government https://www.instituteforgovernment.org.uk/publications/all-change

[58] Department for Business, Innovation and Skills (2016), *Post-16 skills plan and independent report on technical education* https://www.gov.uk/government/publications/post-16-skills-plan-and-independent-report-on-technical-education

[59] The 2017 Green Paper cited data from: OECD (2016) *Building Skills for All: A review of England, using PIAAC 2012 data*, and BIS (2012) *The 2011 Skills for Life Survey: A Survey of Literacy, Numeracy and ICT Levels in England.*

[60] Cable, V. (2014) 'Where next for further and higher education?' speech delivered on 23 April, available at https://www.gov.uk/government/speeches/where-next-for-further-and-higher-education

[61] Conservative Party Manifesto (2017) 'Forward, Together: Our Plan for a Stronger Britain and a Prosperous Future', available at https://www.conservatives.com/manifesto

A successful industrial strategy is likely to include a combination of 'horizontal' and 'vertical' interventions[62] - with system-wide reforms to initial technical education alongside specific interventions that support better skills (and their utilisation) in key sectors and locations. Most countries with successful technical skills systems (e.g. Germany, Austria, Switzerland, Denmark) also have specialist technical institutions within a much more stable policy environment.

Any reforms must be allowed time and sufficient resource to work, even though with the UK's (and specifically England's) track record this is difficult to guarantee. But there are several more factors that need more careful consideration if stability in a new skills system is to fully feed through to productivity improvement.

The components of a new approach

First, there is the issue of joining up policies. Too often skills policy has created a freestanding system with few connections to important parallel interventions, including science and research, investment and place. Skills policy must be more holistic and better integrated into a new industrial strategy as well as better connected to particular industry needs. Furthermore, skills policy tends to focus more on the supply-side - including qualification targets, volumes and curriculum change - and rather less on the demand-side or the context for acquiring and deploying skills.

Secondly, policy interventions must be more flexible and adaptable according to place. The UK is geographically unbalanced in both its stock and flow of skills; most towns, cities and regions outside London and the South East have lower skills levels, volumes and more often than not, weaker and less well funded institutions. The gaps within regions are sometimes as large as between most large cities and London. This suggests that a one size fits all approach in systems, resources or objectives is unlikely to succeed. A new strategy should consider a much more differentiated approach and a renewed commitment to thinking about further devolution in skills policy.

Thirdly, institutional reforms must be cognisant of these first two issues. Any new institution should have the flexibility and autonomy to adapt to place and sector. New institutions must also actively bring employers and supply chain into the skills system and maximise connections - and capacity for other parallel interventions. These might include nearby employer facilities and applied research centres such as the activities brought together at Sheffield City Region's Advanced Manufacturing Research Centre. In the case of the proposed Institutes of Technology this suggests a more active sponsorship and funding role for BEIS as well as for the Department for Education.

Fourthly, more thought must be given to the vertical relationships between the higher education sector and the further education sector as well as to horizontal links to research and innovation. Current and historical policy frameworks too easily force these sectors and incentives into competition or conflict, and rarely into working together.[63] This must change in order to maximise the UK's chances of improving the skills of the population and for those skills to be utilised effectively to optimally drive productivity and growth.

[62] Horizontal reforms refer to those uniform policies to support better skills throughout the workforce such as the planned introduction of T Levels or digital skills. Vertical reforms refer to those specific intervention that are aimed at supporting and improving skills in specific sectors, occupations and industries (sometimes clusters and locations too) often at higher levels of qualification.

[63] See for instance the recently passed Higher Education and Research Act (2017) and Further and Technical Education Act (2017) – both of which reinforce and accelerate a competitive, market environment for both sectors.

Conclusion

Skills policy in the context of an industrial strategy must be better connected to other areas of policy, more stable and holistic in its approach. Both institutions and curriculum must reflect these aims as well as create meaningful links to employers and supply chains. In turn this must build a more meaningful approach to the context and demand for skills so that once achieved, they can be better utilised and thus will be more likely to drive higher growth, productivity and wages. Given the UK's historic deficit in skills, it is also important that policies must be delivered on a horizontal as well as a vertical level, increasing the supply of general technical skills as well as those specific skills that will drive the particular needs of a sector or place. Finally, a skills system - incorporating these principles - must also be flexible and adaptive so that it is able to respond to changing needs and conditions.

The state's purchasing and regulating power

The government has an enormous influence on the economy through its role as a purchaser of goods and services from the private sector; this amounts to about one third of all public sector spending (£242 billion in 2013/14).[64] In addition to direct government spending, a substantial amount of national infrastructure is privately funded in highly regulated sectors, such as energy [65], where the government has both substantial financial exposure (though, for example, loan guarantees) and a high degree of effective control. This amounts to around 30% of the total £300 billion national infrastructure pipeline up to 2020/2021.

There has been an often expressed and long-held ambition to use this purchasing power as an instrument of industrial policy. To date this has not been realised, but it could be in the context of a new industrial strategy.

A change of mindset is needed

Currently, the firmly expressed underlying goal of public procurement policy is cost reduction - '*all public procurement must be based on value for money*' - achieved through free and open competition.[66] This is underpinned by EU procurement rules. But public procurement can be steered to meet public policy goals; for example, there has been a sustained and partly successful effort to open up procurement opportunities to SMEs. In practice, institutional factors are likely to be important, with the imperative to minimise reputational risk to individuals and departments making decisions looming large.

To use procurement to drive industrial strategy through the promotion of innovation at a material scale, there needs to be a change of mindset in departments - a recognition that the strategic goals of departments will only be met through innovation carried out in partnership with the private sector. This does not mean that the overarching imperative to use public money wisely should be relaxed. Instead it means that sometimes short-term savings will need to be foregone in order to reap much larger savings in the longer-term - and that there will need to be some tolerance for the risks that this uncertainty will introduce.

Evidence that mindsets can change, and must change further, is shown by the increasing recognition that governments can make markets where the private sector cannot, by taking on the role of lead customer for new technologies as they are developed. The important work of David Connell resulted in a reshaping of the Small Business Research Initiative (SBRI) in this spirit.[67] The SBRI now accounts for around £75m annual government spending; although there have been undoubted individual successes this is not a scale of activity that is material in the context of overall government spending or the economy at large.

The government asked David Connell in 2016 to undertake a further review of the SBRI, due to report before long.[68] An earlier study of the scheme compared its progress unfavourably

[64] Booth, L., (2015) 'Public procurement', *House of Commons Library Briefing Paper 6029* http://researchbriefings.files.parliament.uk/documents/SN06029/SN06029.pdf

[65] HM Treasury and Infrastructure and Projects Authority (2016) *National Infrastructure and Construction Pipeline 2016* https://www.gov.uk/government/publications/national-infrastructure-and-construction-pipeline-2016

[66] Crown Commercial Service (2017) *Public procurement policy* https://www.gov.uk/guidance/public-sector-procurement-policy

[67] Connell, D. (2014) 'Creating markets for things that don't exist' *Centre for Business Research* http://insight.jbs.cam.ac.uk/assets/Main-report-Creating-markets-for-things-that-dont-exist.pdf

[68] Connell, D., (2016) Review of Small Business Research Initiative (SBRI) https://innovateuk.blog.gov.uk/2016/12/16/review-of-small-business-research-initiative-sbri/

to the American scheme on which it was modelled, the Small Business Innovation Research Programme.[69] It attributed its relative lack of success to a lack of clarity about goals compared to the US scheme, the limited availability of high quality innovative firms, and a lack of commitment to the scheme from participating government departments, who regarded it more as a tax on their budgets rather than a key tool for achieving their own goals.

Infrastructure

The UK has underinvested in infrastructure compared to other OECD countries and ensuring adequate investment, in terms of both the total and its allocation, to meet our current and future needs is a key element of industrial strategy.[70] Indeed, challenges such as decarbonisation and the UK's reliance on some very old infrastructure may mean the total investment needs to increase substantially. Technological change emphasises the importance of new kinds of infrastructure, such as ultra-fast broadband, while existing infrastructure needs continuous maintenance and upgrading. There was no dissent from this view in the responses to our consultation.

The existence of the National Infrastructure Commission means the UK now has a body able to carry out the necessary strategic thinking, and its aims need to be aligned with the strategic goals set in the industrial strategy.

Two key issues in planning infrastructure investment, in addition to alignment with meeting the state's strategic goals, are appraisals and evaluations. As noted earlier, conventional economic appraisal methods contribute to a self-fulfilling dynamic whereby more prosperous areas become more productive, which makes appraisals of further projects look more positive. Hence consideration of infrastructure as part of a new industrial strategy needs to assess more carefully than in the past how to prioritise projects in different places, and the self-fulfilling character of big projects.

There should also be more evaluation of past projects than has been the case to date. Although it is not always easy to do this because of a lack of data or the difficulty of identifying the specific contribution of infrastructure to broader outcomes, rough and ready evaluations are better than not even attempting to do so.

Energy

One of the most challenging long-term commitments the government has made, through the Climate Change Act, is to achieve an 80% reduction in CO2 emissions by 2050, with intermediate carbon budgets to stage progress.[71] From 2023-2027 (the 4th carbon budget) the government is projected to begin missing these targets. The government also wishes to fulfil two other policy objectives - energy security, and energy that is affordable enough not to compromise economic growth. These goals are incompatible and cannot be simultaneously fulfilled with current technology.

---

[69] Tredgett, E. and Coad, A., (2015) The shaky start of the UK Small Business Research Initiative (SBRI) in Comparison to the US Small Business Innovation Research Programme (SBIR) http://www.bbk.ac.uk/management/docs/workingpapers/WP10.pdf

[70] Pisu, M., Pels, B., and Bottini, N. (2015) 'Improving Infrastructure in the United Kingdom' *OECD Economics Department Working Paper No. 1244* http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2015)62&docLanguage=En

[71] HM Government, (2016) *Government response to the Committee on Climate Change: Progress on meeting carbon budgets* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/559954/57204_Unnumbered_Gov_Response_Web_Accessible.pdf

The new energy technologies needed to meet these goals do not just emerge. Research into new energy technologies should be focused on driving their costs down and their scale up, and the government will need to take a more active role in making sure this research takes place and that UK industry benefits from it. The merger of the Department of Energy and Climate Change with the Department of Business, Innovation and Skills to form the Department of Business, Energy and Industrial Strategy offers a new opportunity to connect industrial strategy and energy policy much more closely than has been the case in the recent past.

Decarbonising our electricity supply is a high priority, yet most of our energy generation and use is in the form of directly burned fossil fuels - 82% in 2015.[72] This includes gas for domestic, commercial and industrial use, and liquid hydrocarbons for transport, including sea and air travel. We need to take a holistic view of our energy economy - including generation, infrastructure, house building, and automotives - and search out ways in which energy policy and industrial strategy can be aligned better in all these areas.

Many of these areas of energy consumption will need to be electrified, in conjunction with the introduction of a much smarter grid and better demand management. This will need more electricity generation capacity. In order to meet an 80% CO2 reduction target, close to 100% of electricity generation will need to be low carbon.

A 100% low carbon electricity system will need to rely on some combination of renewables, nuclear, and gas with carbon capture and storage. The problem of the intermittency of renewables will need to be overcome with some combination of new energy storage technologies and better demand management. Perhaps the most pressing problem is the need to replace existing nuclear generating capacity. The urgency arises because, of the existing fleet amounting to 8.9 GW, all but 1.2 GW will need to be retired by 2030.

Since 2008, it has been the policy of the UK government, through successive administrations, to support a programme of nuclear new build, to be financed and operated by the private sector. Currently plans exist to build up to 16 GW of new nuclear capacity, including the 3.2 GW at Hinkley Point C, at a total capital cost of at least £60 billion. This programme is an ideal case study of the way energy policy and industrial policy have been connected in the past, and should be connected better in the future.

The stipulation that the nuclear new build programme should not receive direct government funding or subsidies has greatly reduced the government's degree of leverage over the programme. Yet the government remains financially exposed through loan guarantees, and through contract-for-difference agreements. It indirectly guarantees very long-term revenue flows through commitments to the price consumers and industry will pay for electricity.

Most of the developers and all the technology vendors involved are based overseas and although the projects will involve large contracts with UK suppliers, this weakens the scope for developing UK supply chains for the highest value elements, as does the fact that the capital funding is sourced wholly from overseas organisations, including some with substantial shareholdings by overseas governments. Further, the selection of different technologies by different owners for the different sites means that each will need to develop its own supply chain independently.

The energy transition we need to make to an affordable, low carbon future is enormously challenging, yet it also offers huge opportunities for UK industry to develop innovative new products and services. Done right, an industrial strategy for energy should deliver two goals - securing affordable low carbon energy at the same time as improving productivity and economic growth across the country.

[72] Department for Energy and Climate Change (2015) *Digest of UK Energy Statistics 2015* https://www.gov.uk/government/statistics/digest-of-united-kingdom-energy-statistics-2015-internet-content-only

Procurement in health and social care

The conflict between the short and long-terms is nowhere more pressing than in health and social care. NHS England currently spends around £9 billion on procurement (not including medicines [73]); of this about one third is spent on everyday goods and services, one third medical consumables, and one third high cost medical devices.[74] Given the extreme budget pressures that the NHS is under, it is not surprising that the emphasis in its procurement is on reducing this cost. Currently this is made difficult by the highly fragmented way in which the health system is organised - in the words of the Carter Report (2016) into operational productivity and performance there is 'a systematic failure to capitalise on the national nature of the NHS.[75]

This failure to operate nationally also militates against experimentation with more innovative services and products. Moreover, the barriers to the introduction of new technology are often institutional or organisational in character. One illustration of this is the boundary between health and social care - delayed transfers of care, where a patient is healthy enough to be moved from an acute bed, but where care is not available, currently cost an estimated £900m a year for NHS England alone, and also causes major distress to patients and their families. Many technological solutions to make it easier and safer to live independently can be imagined, but if the basic institutional structures that could permit this are not in place these cost-saving advances will remain unrealised.

There is a recognition that technological innovation needs to be developed in the clinical context in which it is going to be used in the NHS Test Beds programme.[76] The programme invites private sector companies to work in partnership with NHS and social care organisations to develop innovations that can be practically implemented in the health and social care system. To be successful, such programmes will need a commitment from the participating health and social care organisations to reform their working practices to make the most of these innovations, and stronger commitments to the participating companies that they will be able to find a large market in the NHS nationally for successful innovations that emerge from the programme.

The place dimension in procurement

It is often suggested that weaker economic regions should be supported by local and regional government organisations buying preferentially locally. There may be arguments in favour of this, but there are of course risks that this simply creates a zero sum game across the country as a whole, or, at worst, provides an invitation to rent-seeking and incumbency bias. But in situations where users and innovators can be brought together, particularly where system/institutional level change is required to benefit from technological innovation, there can be an argument that local procurement can support the development of a geographical cluster of expertise.[77]

---

[73] The 2014-15 cost of medicines in England was £15.5 billion. This represents a rise on immediately previous years, though evidence from the Health Foundation presents a long-term fall in average medicine prices as compounds come off patent.

[74] Carter, P. (2016) *Operational productivity and performance in English NHS acute hospitals: Unwarranted variations* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/499229/Operational_productivity_A.pdf

[75] Ibid.

[76] Information about the Test Beds programme is available at https://www.england.nhs.uk/ourwork/innovation/test-beds/

[77] Uyarra, E. et al, (2017) 'Anchoring the innovation impacts of public procurement to place: The role of conversations', *Environment and Planning C: Politics and Space*, 0(0) 1–21 http://journals.sagepub.com/doi/full/10.1177/2399654417694620

Conclusion

The state is an enormously powerful actor in the economy, both through its role directly purchasing goods and services from the private sector, and through its role as a regulator. This power is not currently used effectively in ways that would drive innovation and long-term growth.

The role of the state as a lead customer for new technologies should be exploited in support of the innovation needed to meet the state's key strategic goals. These goals, as we have set out, include the renewal of the UK's neglected infrastructure base, the development of an affordable and secure low carbon energy economy, and making our health and social care system more effective, humane and affordable.

To achieve this, there will need to be a change in mindset from the one that regards the goal of procurement policy to be solely to achieve short-term cost savings, to one that recognises that only through driving innovation will the long-term goals of the state be met. In infrastructure investments, appraisal methods need to be more forward looking and recognise the potential for the right investments to achieve qualitative, rather than marginal, change. The institutional barriers that work against innovation in health and social care need to be broken down. Overall, this new approach will require a higher institutional tolerance of risk, and needs to be supported by more systematic appraisal of outcomes.

About the Industrial Strategy Commission

The Industrial Strategy Commission is an independent, authoritative inquiry into the development of a new, long-term industrial strategy for the UK.

The Industrial Strategy Commission is a joint initiative by Policy@Manchester at The University of Manchester and the Sheffield Political Economy Research Institute (SPERI) at the University of Sheffield.

The Commission was formally launched in March 2017. Its final report will be published in October 2017.

The Commission's first publication - a response to the Government's consultation on their Green Paper on industrial strategy - was published in April 2017.

http://industrialstrategycommission.org.uk/

Evidence and engagement

Over the first half of 2017 the Commission has conducted its evidence gathering and engagement with stakeholders in a variety of ways.

- An open call for evidence between February and May. Over 80 submissions were received from a wide range of UK and international stakeholders including businesses and business organisations from a range of sectors and industries, academics, thinktanks and members of the public.
- Evidence sessions in London, Birmingham, Sheffield, Manchester and Cambridge. Evidence sessions explored challenges and opportunities for industrial strategy across a range of policy areas and themes including health and social care, Industry 4.0, the importance of 'place' and advanced manufacturing.
- Private interviews with leading industry, academic and central government stakeholders.
- Policy engagement with key stakeholders in the Department for Business, Energy and Industrial Strategy, the Department for Communities and Local Government and HM Treasury.

Funders

The Industrial Strategy Commission has been supported by The University of Manchester and the University of Sheffield.

Commissioners

Dame Kate Barker (Chair)

Dame Kate Barker was an external member of the Bank of England's Monetary Policy Committee between 2001-2010 and is a former Chief Economic Adviser at the CBI. She has conducted major independent policy reviews for the UK government on Housing Supply and Land Use Planning. In 2017 she was appointed as a Commissioner of the National Infrastructure Commission.

Dr Craig Berry

Craig Berry is the Deputy Director of the Sheffield Political Economy Research Institute (SPERI) at the University of Sheffield. Craig's research specialises in UK economic policy, finance, manufacturing and pensions. Craig was previously a policy adviser on state pensions and older people at the Treasury, Pensions Policy Officer at the Trades Union Congress, and Head of Policy and Senior Researcher at the International Longevity Centre-UK (ILC-UK).

Professor Diane Coyle

Diane Coyle is Professor of Economics at The University of Manchester and co-director of Policy@Manchester. Diane is the founder of Enlightenment Economics, a Fellow of the Office for National Statistics and a member of the Natural Capital Committee. She was Vice-Chair of the BBC Trust between 2006-2015, a member of the Migration Advisory Committee between 2007-2012 and a member of the Competition Commission between 2001-2009.

Professor Richard Jones

Richard Jones is Professor of Physics at the University of Sheffield and a Council Member of the Engineering and Physical Sciences Research Council. From 2009 to 2016 he was Pro-Vice Chancellor for Research and Innovation at the University of Sheffield. He is an Associate Fellow of SPERI and a Fellow of the Royal Society. Richard specialises in nanotechnology and in science, innovation, productivity and economic policy.

Professor Andy Westwood

Andy Westwood is the Associate Vice President for Public Affairs at The University of Manchester and co-director of Policy@Manchester. He is a Professor of Politics and Policy and Director of the University Observatory at the University of Wolverhampton. Andy is the President of the OECD's Forum for Social Innovation and has held senior roles at GuildHE, The Work Foundation, Centre for Economic and Social Inclusion as well as working as an adviser within various government departments.

Tom Hunt, Policy Research Officer at the Sheffield Political Economy Research Institute (SPERI), manages the work of the Industrial Strategy Commission. Tom has overseen the evidence gathering and engagement activities of the Commission and co-ordinates the production of its reports and outputs.

Dr Marianne Sensier, an economist at The University of Manchester, provides research support to the Commission.

The Industrial Strategy Commission

The Industrial Strategy Commission

contact@industrialstrategycommission.org.uk

industrialstrategycommission.org.uk

@IndStrategyComm