

# The New Industrial Strategy



Jonathan Dupont and Richard Howard



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**Policy Exchange** is the UK's leading think tank. We are an educational charity whose mission is to develop and promote new policy ideas that will deliver better public services, a stronger society and a more dynamic economy. Registered charity no: 1096300.

Policy Exchange is committed to an evidence-based approach to policy development. We work in partnership with academics and other experts and commission major studies involving thorough empirical research of alternative policy outcomes. We believe that the policy experience of other countries offers important lessons for government in the UK. We also believe that government has much to learn from business and the voluntary sector.

#### **Trustees**

Diana Berry, Candida Gertler, Greta Jones, Edward Lee, Charlotte Metcalf, Krishna Rao, Andrew Roberts, George Robinson, Robert Rosenkranz, Peter Wall.

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## About the Authors

**Jonathan Dupont** joined Policy Exchange in April 2014 as a Research Fellow in the Economics & Social Policy Unit. Prior to joining, he worked as a parliamentary researcher, an independent economic researcher and an analyst for the There is Nothing British about the BNP campaign. He has co-written multiple books on public policy, including *A Time for Choosing* for Palgrave Macmillan and *Gridlock Nation* for Biteback Publishing.

**Richard Howard** joined Policy Exchange in 2014 as Head of the Environment & Energy Unit. He has since produced a number of influential reports on topics including energy policy and regulation, energy efficiency and fuel poverty, and air quality. Richard has more than 10 years' experience in energy and environmental policy, economics, and government affairs. His last role was as Chief Economist at The Crown Estate, and prior to that he worked as an economic consultant.

**Tom Galloway** joined Policy Exchange in February 2016 as a Research Intern working principally with the Environment and Energy Unit. Before joining Policy Exchange he was completing an MA at SOAS, University of London.

This draft was finished on the 6th of December.

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Published by  
Policy Exchange, 8 - 10 Great George Street, Westminster, London SW1P 3AE  
[www.policyexchange.org.uk](http://www.policyexchange.org.uk)

ISBN: 978-1910812-28-0  
Printed by Heron Dawson and Sawyer

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# Executive Summary

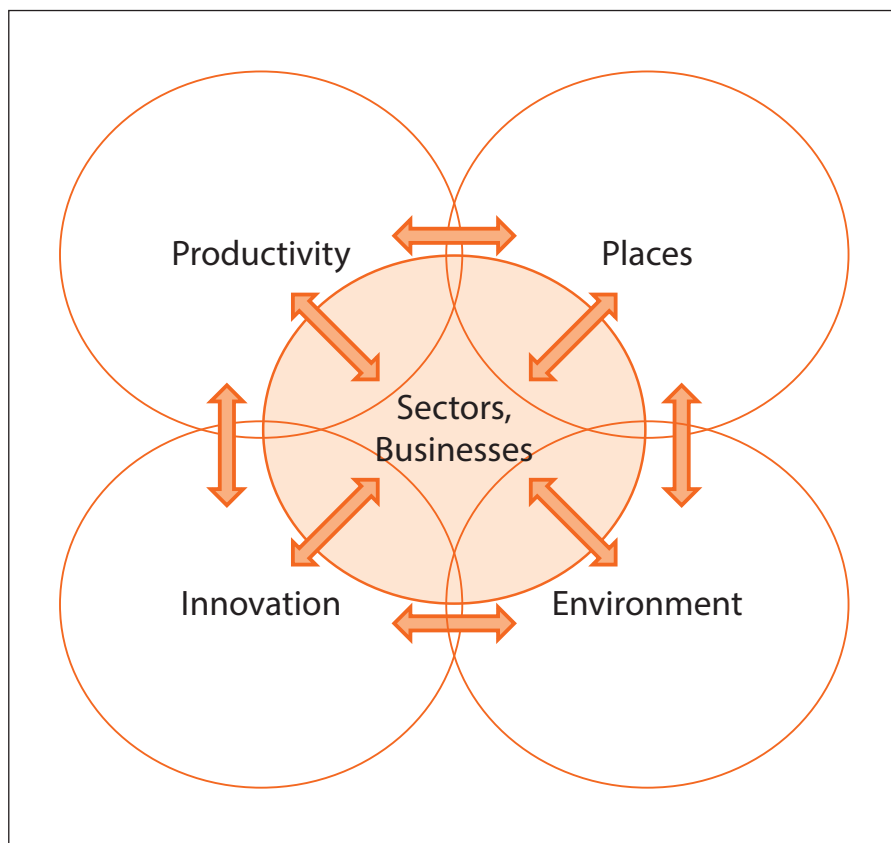
## Why do we need an industrial strategy?

- Industrial policy has always been as much about politics as economics. Today, too many people worry that globalisation and the modern world do not work for them. Britain's 'Just About Managing' majority is pessimistic about our economic future, believing the best now lies behind us. Economic insecurity is not a sufficient explanation for the recent votes for Brexit or President Trump, but a sense of economic optimism remains necessary to stop us becoming a divided nation. The overriding goal of a new Industrial Strategy should be to create an economy in which everyone can look forward to the future.
  - Globalisation has been good for the world and for Britain. It is understandable, however, why many people have become increasingly pessimistic:
    - Productivity and real household incomes have been stagnant for over a decade.
    - Many parts of Britain have not shared in the same success seen in London and the South East.
    - While innovation is alive or accelerating in the digital world, in the physical world there are fears it may be stagnating.
    - The cost of living and household bills continue to increase – utility prices have doubled in the last decade – but voters aren't confident that this is really delivering environmental sustainability.
  - The record of past industrial policies or strategies is a mixed one. What lessons can we draw to avoid the mistakes of the past?
1. **Encourage competition rather than national champions.** The 1930s and post-war move away from competition was one of the worst British economic policy mistakes of the twentieth century, leading to substantial and ongoing harm in productivity and household incomes.
  2. **Picking winners in some cases is unavoidable – it's stopping the support of losers that matters.** No Government is completely neutral in the decisions it makes over skills, science, procurement or infrastructure. The key is to prioritise policies that can unlock emerging potential, rather than try and unsustainably tilt the playing field. Equally, much more important than making a perfect plan upfront is having an ongoing process to identify bad bets rather than continually chasing lost sunk costs.

3. **Regional growth is not a zero sum game.** The 1945 Distribution of Industry Act largely failed in its attempts to regenerate deprived areas, but it did succeed in cutting off the growth of previously thriving cities like Birmingham. The competition between our major cities is not a zero sum game, and London is as much an asset as much as a rival to other major cities such as Birmingham and Manchester.
4. **Stay outward looking, rather than try to hide behind protectionist barriers.** Britain, in particular, has much to gain from building on its strengths as a global hub, deriving from its language, heritage, time zone, and as home of the world's greatest metropolis.
5. **Innovate for the future, rather than trying to return to the past.** No government policy could have prevented the relative decline of manufacturing during the twentieth century. The attempts to halt the decline in manufacturing often distracted Government from policies that could have developed new economic strengths, or softened made the final economic adjustment when it finally came.
6. **Government intervention can be as much the problem as the solution.** Often the barrier to increased efficiency is less from defects in the private sector, and more from Government failures to deliver adequate infrastructure, an agile planning system or high quality vocational education.
7. **The economy cannot be considered in isolation from wider social and environmental factors.** For example, expanding the use of cheap coal may give Britain a short-term economic advantage, but would not be in the best interests of the planet. In retrospect, much of past industrial policy was focussed on industries with significant negative externalities.

## Developing a modern industrial strategy

- Britain's economy has many strengths to build upon, including the City of London, its time zone and language, unparalleled heritage and culture, its universities and research base, trusted institutions, flexible regulation and the world's leading metropolis.
- Any new Industrial Strategy has to be forward rather than backwards looking, taking account of the changed circumstances from increased automation, stagnating productivity, 'peak globalisation', Brexit and climate change.
- How can Britain build on its strengths, address its weaknesses and position itself best for an uncertain future? This paper identifies four interlinked economic challenges in Britain: Productivity, Place, Innovation, and Environment.



### Productivity: Why has Britain fallen behind?

- In many areas, the supply side of the UK is not doing too badly. Britain has been a world pioneer in encouraging competition, the share of British adults with high level skills is significantly above the OECD average, and investment is actually higher in Britain than in Germany when you include intangibles.
- However, where Britain has really suffered is having a long tail of underperformance:
  - Compared to the US, insufficient competition, skill shortages and a legacy of old family firms has left Britain with significant numbers of poorly managed firms.
  - The UK has a high proportion of workers with below secondary school levels of attainment and poor skills.
  - Whilst the UK's infrastructure is generally good, it suffers from small scale pinch points, such as the poor state of its roads.
- On top of this, Britain faces two other challenges to productivity in the near term – Brexit and the 'productivity puzzle'. Leaving the EU will require new policy to ensure effective competition remains protected, while there is still no consensus around the fundamental causes of the productivity puzzle.



## Place: Is Britain unbalanced?

- No country has an equal distribution between its cities, and London's share of the UK's economy is actually right in line with the OECD average. Where Britain is an outlier is in its second tier of cities. Both Birmingham and Manchester make up around 3% of the UK's GDP, compared to the OECD average for second and third place cities of 9% and 5% of GDP.
- The historical experience of the twentieth century was that industrial monoculture cities like Detroit were vulnerable to disruption in their economic powerbase, while more diverse cities built on broader trading or knowledge advantages were able to pivot. Manchester never quite recovered from the decline of Britain's cotton industry after the First World War, while Birmingham suffered when the car industry went into decline.
- However it is too easy to say that relative decline was inevitable. Overly restrictive planning and Britain's overly centralised politics has accelerated the decline of manufacturing, held back the growth of Birmingham, and encouraged a damaging industrial monoculture. It is hardly surprising that Britain's second cities struggled to pivot to the knowledge economy when office space in Birmingham is more expensive than in Manhattan.
- While there is room for more than one city in the British economy to thrive, we have to be realistic that not every town can or should be a world leader in Gross Value Added. Britain's highly centralised system of uniform rates for public sector pay, minimum wages and benefits, is systemically driving up labour costs in many areas beyond sustainable levels, pricing many people out of employment and accelerating the process of de-marketisation.

## Innovation: Is it slowing?

- The growth of innovation and efficiency (Total Factor Productivity) in the OECD has slowed from an average of 2.5% per year during the 1950s, to 0% per year in the 2000s. While some of this is due to the difficulties in measuring an increasingly intangible and non-monetised economy, it is hard to avoid the conclusion that in recent decades we have seen less progress in the worlds of atoms and molecules than bytes and words.
- One explanation for this is natural physical constraints, but there are also reasons to believe that excessive regulation has been a significant factor in the slowing of innovation. Overall, the level of regulation is statistically associated with slower TFP growth. The excessive use of the precautionary principle has slowed down growth in diverse fields from pharmaceuticals to energy.
- Brexit offers the possibility for Britain to seek a new role as a world pioneer for innovation. Britain is already third in the world for innovation as measured by the Global Innovation Index, and combines world leading science, liberal regulation, financial expertise and international connections.
- However, to really thrive, Britain will have to not just come up with new ideas but overcome its longstanding struggle to commercialise new research, create new companies and develop industries outside the M25. At present, only six of the 177 tech unicorns, or start-ups valued over \$1 billion, are located in the UK. British companies still seem to struggle to overcome the 'valley of death' between initial prototype and final product, while our spending on applied development remains significantly below our peers.

## Environment: How can we ensure the Industrial Strategy is green?

- The economy does not operate in a vacuum, but within an environmental ecosystem consisting of natural assets and resources. There is a growing recognition that climate change and other environmental issues present real risks to business and the economy. The World Economic Forum identifies climate change, water crises, biodiversity loss, and ecosystem collapse as amongst the greatest global risks.<sup>1</sup>
- In order to be successful and sustainable, the Industrial Strategy needs to factor in environmental concerns, to ensure that economic growth goes hand in hand with the protection of natural assets, sustainable use of natural resources, and climate change mitigation and adaptation.
- There is a growing consensus that the new Industrial Strategy must be ‘green’, but much less consensus on what this means in practice. Past approaches have tended to focus on how to grow the ‘green economy’ and ‘green jobs’ through costly subsidies to particular sectors and technologies. Going forward, the Industrial Strategy needs to consider how to green the economy more broadly. Amongst other things this will require a transformation of our energy and transport infrastructure from high-carbon to low-carbon.
- Whilst climate change presents many risks, it also offers opportunities. The UK could achieve significant economic gains by embedding sustainable thinking into its Industrial Strategy. There is significant potential to increase business productivity through improvements in energy and resource efficiency, but firms often fail to capitalise on this potential due to economic, financial and behavioural barriers.
- The UK also has the potential to develop and produce low carbon and environmental technologies – building on its existing strengths, as well as spotting emerging opportunities. The UK has a world-class science and research base, but needs to do more to bridge the ‘valley of death’ between basic research and commercialisation, and create a regulatory environment which encourages innovation and entrepreneurship.

## Next Steps

Over the next year, Policy Exchange will be undertaking an extensive programme of work to better understand how to create a modern industrial strategy. This will develop the themes identified in this paper, through a series of research papers and events.

If you would like to discuss this further, then please contact Policy Exchange, as follows:

### **Jonathan Dupont**

Research Fellow - Economics and Social Policy  
Jonathan.dupont@policyexchange.org.uk

### **Richard Howard**

Head of Environment and Energy Unit  
Richard.howard@policyexchange.org.uk

1 <http://reports.weforum.org/global-risks-2016/global-risks-landscape-2016/#landscape>

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# Why do we need an industrial strategy?

## What is an industrial strategy?

There is no universal definition of industrial policy.

While policies targeting specific industries and sectors go back to at least medieval times, the phrase was not widely used in Britain and America until the 1970s, motivated by fears that the western model was falling behind East Asian economies like Japan. One recent review paper listed as many as 17 subtly different definitions – and naturally, also offered its own. Equally, while the phrase “industrial strategy” is sometimes used for a slightly broader approach, in practice there is no consistent difference between it and an ‘industrial policy.’<sup>2</sup>

From the beginning, the debate over industrial policy or strategy has been complicated by confusion over two related but distinct interpretations:

- It is a narrow, sector-based agenda with a focus on the special role of manufacturing in the economy.
- It is a broader, horizontal agenda taking in any area where government needs to intervene to overcome a damaging short-term equilibrium.

For a developing nation, like today’s emerging economies, a post war Japan, or even the nineteenth century US, these definitions largely overlapped. Manufacturing was the future of the economy, the next step after agriculture, and the focus of policy should be to hurry along progress.

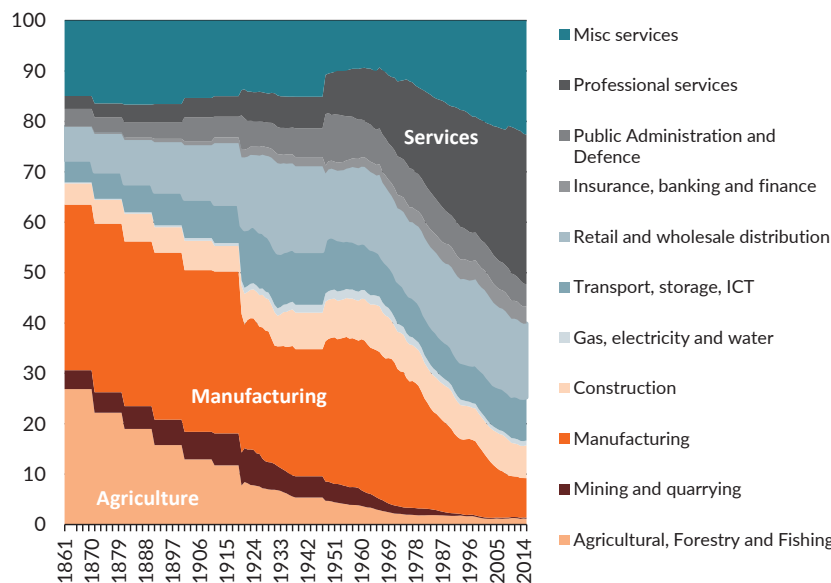
But for Britain, the first major nation to industrialise and kick off the modern era of growth, it was never quite this simple. Manufacturing already made up around a third of employment by the mid nineteenth century – a greater share than agriculture – and it stayed roughly at this proportion for the next hundred years.

Over the last half-century, manufacturing has been falling as a share of employment, from a high of 30% in 1961 to around 8% today (Figure 1). There are good reasons to believe that the fall may now slow, and manufacturing will continue to play a vital role in the modern economy. However, almost nobody expects manufacturing to substantially increase as a share of employment again.<sup>3</sup>

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<sup>2</sup> Beyond Industrial Policy, Ken Warwick, 2013, <http://www.oecd-ilibrary.org/docserver/download/5k4869clw0xp.pdf>

<sup>3</sup> The Future of Manufacturing: A New Era of Opportunity and Challenge for the UK, Government Office for Science, 2013, <https://www.gov.uk/government/publications/future-of-manufacturing>

**Figure 1: Share of Employment by Sector (Bank of England)**

What is more, the old distinction between manufacturing and services is becoming increasingly blurred:

- The perceived wisdom is that trade or robots are taking our manufacturing jobs. However the reality is that over half of the decline in manufacturing in the UK is explained by consumers choosing to spend increases in their incomes on goods rather than services. Just 13% of the increase in incomes since 1980 has been spent on manufactured goods.<sup>4</sup> Just as food used to take up over half of household budgets and the economy was accordingly dominated by agriculture, we have become somewhat satiated with physical goods, and chosen to spend more of our money elsewhere.
- Productivity growth is faster in manufacturing than services – growing almost twice as much (177%) since 1948.<sup>5</sup> However, contrary to claims by some economists, there is little evidence that manufacturing is unique in its ability to drive innovation or growth. Even if the difficulty in measuring quality improvements in services is ignored, overall there is a weak negative correlation between the share of manufacturing in the economy and GDP per capita, or total productivity.<sup>6</sup> (Neither is there a correlation between the share of manufacturing and the overall trade balance.) Given the small magnitude, these results are likely driven by outliers. Overall, however, it is probably safest to assume that there is no correlation between the relative sizes of services and manufacturing and overall growth.
- The dividing line between manufacturing and services is increasingly unclear. Manufacturing is becoming more service-like, with increased emphasis on client customisation and reliance on high end programmers and technicians. Manufacturing is becoming a knowledge industry. Equally, new technologies in machine learning and big data make many services more routine, allowing them to be automated and see the kind of productivity increases so far only enjoyed in manufacturing.

<sup>4</sup> The impact of Government policies on UK manufacturing since 1945, Stephen Broadberry and Tim Leunig, 2013, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/277158/ep2-government-policy-since-1945.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/277158/ep2-government-policy-since-1945.pdf)

<sup>5</sup> Author calculation from ONS data

<sup>6</sup> Author calculation from OECD data

- Even if manufacturing did increase as a share of the economy, it would be unlikely to bring back many jobs with it,<sup>7</sup> and those jobs are unlikely to be the kind of meaningful, high paid, middle skill jobs that made the sector so attractive to politicians in the past. The typical manufacturing worker of the future is as likely to be a programmer as a blue-collar worker. These remain important jobs and industries to have, but they will not be able to support the bulk of middle-skilled employment in the future.

## The Divided Economy

Given that a modern industrial strategy can't just be about restoring Britain's manufacturing sector, what is it about? What is the question to which industrial strategy is the answer?

Industrial policy has always been as much about politics as economics. In the nineteenth century, industrial policy was seen as a way for Germany and the US to catch up with the economic strength of Britain. In the post-war period, Britain in turn looked to industrial policy as a solution to its own relative decline.

Today, the obvious preeminent political and economic problem is the increased perception by many that globalisation and the modern world do not work for them.

It is far too simplistic to attribute the votes for Brexit and President Trump to economic determinism alone. In Britain's case, more people attributed their vote to concerns over sovereignty rather than immigration or trade, believing that "decisions about the UK should be taken in the UK."<sup>8</sup>

If anything, economic factors are likely to be much less significant factors in the rise of populism than the growth of identity politics, the group-think effects of new forms of media, and, of course, genuine concerns over the failure of traditional elites. Trump voters in the Republic primaries had average incomes of \$72,000 - well above the US average.<sup>9</sup> Eric Klein has shown that income or concerns over inequality do not predict how you voted on Brexit or the Presidential election nearly as well as support for the death penalty or concerns over immigration.<sup>10</sup> Similarly, Inglehart and Norris (2016) show that support for populism across Europe is driven most by cultural factors, with economic insecurity adding little explanatory value.<sup>11</sup>

However, while economic pessimism is not a sufficient explanation by itself, it still matters. Changes in culture can amplify long standing economic grievances. Both Trump and Sanders primary voters were among the most economically pessimistic,<sup>12</sup> whereas Leave votes were significantly higher in areas most affected by Chinese competition.<sup>13</sup> Overall, there is a modest correlation between the Leave vote and median wages (an R2 of 0.24), the local size of manufacturing (0.24) or the proportion of 'Process, plant and machine operative' workers (0.25).<sup>14</sup> Many parts of the economy feel that it is no longer working for them.

The attention of the political system has generally been focused on the needs of the top and the bottom – those seen either as 'wealth creators' or in need of support from welfare. However, the majority of voters, and particularly those in marginal seats, are somewhere in the middle – the "Just About Managing" classes.<sup>15</sup> In a major publication released in 2015, Policy Exchange argued that Government should seek to improve the everyday lives and life chances of Just About Managing households. They are not poor, but are far from well off. Their most important values are family and fairness, and their biggest policy priorities are keeping the cost of living down, controlling immigration and improving the

7 Manufacturing Jobs Are Never Coming Back, Ben Casselman, FiveThirtyEight, Mar 18 2016, <http://fivethirtyeight.com/features/manufacturing-jobs-are-never-coming-back/>

8 <http://lordashcroftpolls.com/2016/06/how-the-united-kingdom-voted-and-why/>

9 The Mythology of Trump's 'Working Class' Support, Nate Silver, FiveThirtyEight, May 3 2016, <http://fivethirtyeight.com/features/the-mythology-of-trumps-working-class-support/>

10 It's NOT the economy, stupid: Brexit as a story of personal values, Eric Kaufman, LSE, <http://blogs.lse.ac.uk/politicsandpolicy/personal-values-brexit-vote/>; Trump and Brexit: why it's again NOT the economy, stupid, Eric Kaufman, LSE, <http://blogs.lse.ac.uk/politicsandpolicy/trump-and-brexit-why-its-again-not-the-economy-stupid/>

11 Trump, Brexit, and the Rise of Populism: Economic Have-Nots and Cultural Backlash, Ronald Inglehart and Pippa Norris, 2016, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2818659](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2818659)

12 Sanders and Trump really are the candidates of economic pessimism, Lee Drutman, Vox, April 1 2016, <http://www.vox.com/polyarchy/2016/4/1/11340264/sanders-trump-economic-pessimism>

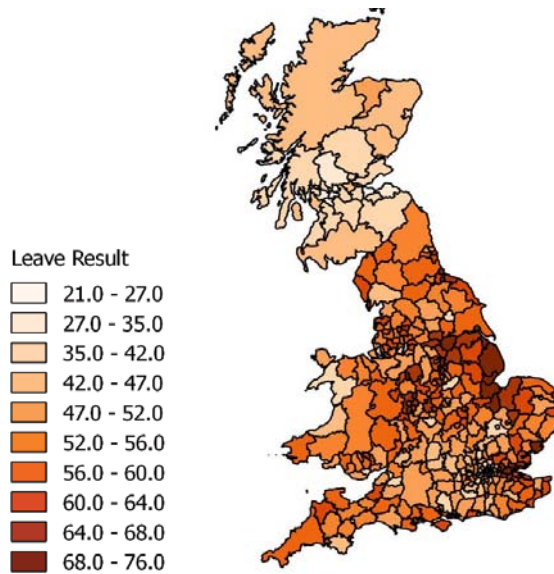
13 The real reason the U.K. voted for Brexit? Jobs lost to Chinese competition, Italo Colantone and Piero Stanig, Monkey Cage, The Washington Post, July 7 2016, <https://www.washingtonpost.com/news/monkey-cage/wp/2016/07/07/the-real-reason-the-u-k-voted-for-brexit-economics-not-identity/>

14 The picture is complicated, however. There is no correlation between the Brexit vote share and the fall in manufacturing and energy employment between 1981 and 2001, or between Brexit vote share and relative wage stagnation. Just as cultural changes have caused many older voters to feel 'left behind' by wider changes in society, the impact may be mediated less via a direct impact on voters' day to day life and more by impressions over broader changes in the economy.

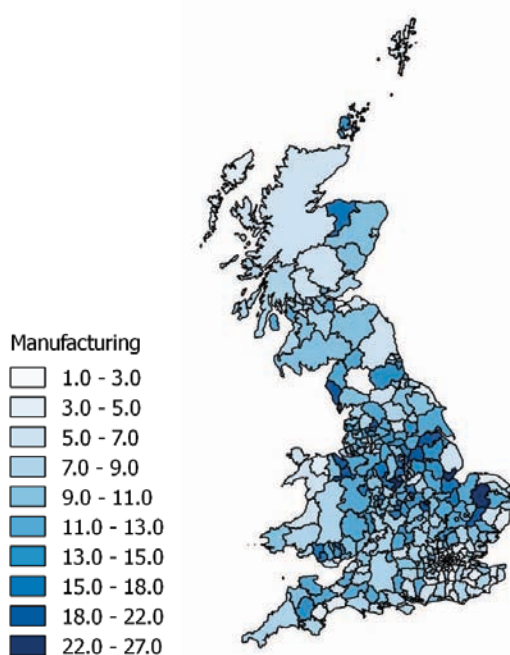
15 Overlooked But Decisive: Connecting with England's Just About Managing classes, James Frayne, 2015

quality of the health system.<sup>16</sup> Just About Managing voters were more likely than the population as a whole to vote for Brexit (a correlation of 0.36). Like the population in general, they are both highly worried about future growth and are suspicious over whether companies in concentrated markets like energy are giving them a fair deal. Improving the lives of Just About Managing households has become an explicit focus of Government policy under Theresa May's leadership.

**Figure 2: 'Leave' Share of Referendum Result**



**Figure 3: Manufacturing Share of Employment (ONS)**



<sup>16</sup> Overlooked But Decisive: Connecting with England's Just About Managing classes, James Frayne, 2015

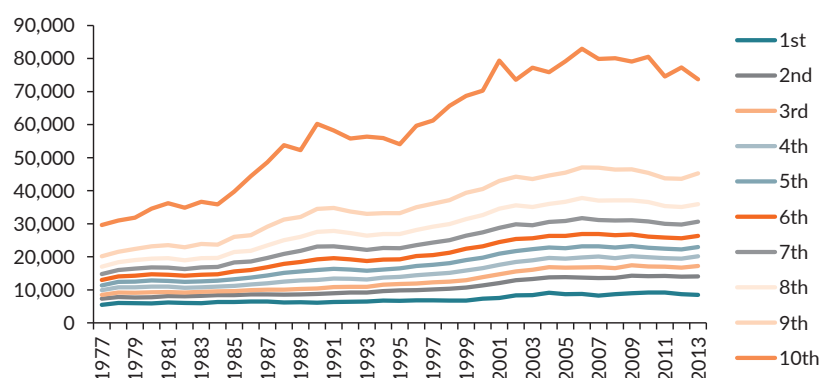
Why do so many people feel pessimistic about the future of Britain's economy?

The long term impact of globalisation on Britain's economy and voters is complicated. Nobody doubts that it has been a boon to emerging economies, helping take a billion people out of absolute poverty and delivering a world of unprecedented openness, choice, and diversity. Most estimates suggest that technology has played a much larger role than trade in the loss of traditional jobs, while Britain has actually done relatively well economically since the 1970s. Between 1976 and 2007, per worker productivity growth was faster in the UK than in France, Germany or the US, while since the early 1990s the UK has not seen the same shrinking male labour participation rate suffered by the US.

The last decade has been different.

Since 2003 or so, Britain has suffered a 'perfect storm' hurting real incomes: the financial crisis, higher pension costs, increased taxes and significant inflation from a global commodities crunch.<sup>17</sup> Across the income distribution, real household incomes have been broadly static. While employment and the labour market have continued to be a success story, productivity has failed to grow. After two decades of delivering lower consumer prices, globalisation and high demand from emerging economies saw commodity prices spike nearly three times over between 2003 and 2013.

**Figure 4: Real Equivalised Disposable Household Incomes by Decile (ONS)**



Coming after two decades where household incomes increased by 35% and 36% respectively, it is unsurprisingly that stagnation has led to widespread pessimism. Recent polling for Policy Exchange found that 33% of the population in marginal seats thought that "Britain is decline and our best is all behind us", while 52% agreed that "Young people today will probably grow up to have a worse quality of life than their parents."<sup>18</sup>

If we are to reverse this pessimism and create an economy where everyone can look forward to the future, we need to address four big challenges:

- **Productivity has been near stagnant for over a decade.** In the long run, wages are closely linked to levels of productivity. If this slowdown can't be turned around, we are likely to see flat-lining wages and living standards for

<sup>17</sup> No Worker Left Behind, Jonathan Dupont, Policy Exchange, 2015

<sup>18</sup> Overlooked But Decisive: Connecting with England's Just About Managing classes, James Frayne, 2015



decades to come. Many of Britain's perceived old economic advantages, from North Sea oil and gas, to financial services, look less likely to be a source of strength in future.

- **Many parts of Britain have not shared in the same success as London and the South East.** GVA per head in London is 2.3 times as high as in the North East, while in Camden and the City of London it is a staggering 20 times higher than Dudley, Northumberland or Blackpool.<sup>19</sup>
- **While innovation is alive, or even accelerating in the digital world, in the physical world there are fears it may be slowing.** If anything, Britain is getting worse at building new infrastructure such as roads and airports, not better.
- **The cost of living and household bills continue to increase – utility prices have doubled in the last decade – but voters aren't confident that this is delivering environmental sustainability.** A modern industrial strategy cannot ignore climate change and other environmental concerns – but it has to do this in a way that doesn't unnecessarily raise the cost of living for struggling households.

What can we do to tackle these problems – and can an industrial strategy help?



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# Where did industrial policy go wrong in the past?

## The History of Industrial Policy

If a new industrial strategy is to be a success, it is important to learn from the mistakes that were made in the past.

From the very beginning, industrial policy was controversial with classical liberals. Adam Smith's *The Wealth of Nations*, the founding text of modern economics, was written largely as a response to mercantilism, the industrial policy of the day. In turn, Alexander Hamilton's *Report on Manufactures* and Friedrich List's *National System* were written in response to Smith. Using what we would now recognise as the 'infant industry' argument, the two intellectual fathers of industrial policy argued that free trade might be good for mature industries, but new companies needed some protection as they developed the economies of scale needed to compete.

List argued that Britain owed much of its economic success in the nineteenth century to early industrial policy and protectionism – an argument repeated to this day by modern economists such as Ha-Joon Chang. The majority of modern scholars would not point to this as a significant factor. It is true, as Chang argues, that English rulers from Henry VII to Robert Walpole introduced substantial policies to tilt the scales in favour of domestic wool producers, from protectionist tariffs and subsidies to the imports of skilled labour.<sup>20</sup> However, these policies were hardly unique to Britain – France's Colbert, after all, being their most famous proponent. Trade, whether free or controlled, likely had little to do with the origins of modern growth.<sup>21</sup> While the true origins of the Industrial Revolution still remain the great puzzle of economic history, most current experts would instead point to some combination of liberal institutions, high human capital, cheap energy, empirical science and a shift in rhetoric in favour of entrepreneurialism.

Infant industry protectionism may be less good at identifying the industries of the future, but could it at least help other nations catch up with the front runners? The evidence on this is mixed. By the turn of the century, American GDP per capita was moving ahead of the UK.<sup>22</sup> Both the US and Germany seemed to be doing better than Britain in taking advantage of new technologies in chemistry, electricity, and the standardisation of manufacturing.

The extent to which this was down to their 'National Systems' rather than free trade is hard to say. While both Germany and America made use of protectionist external policies in the nineteenth century, they also saw a radical intensification of internal trade as the US expanded west, and Bismarck consolidated the Zollverein tariffs union into a new nation. West German GDP per capita did not actually overtake Britain until 1970 – but this came after twenty years where German 'ordo-liberalism' had not so much followed a traditional industrial policy as remained strongly committed to free markets, strong competition and limited government.<sup>23</sup>

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20 Kicking Away the Ladder: The "Real" History of Free Trade, Ha-Joon Chang, December 2003

21 Bourgeois Dignity: Why Economics Can't Explain the Modern World, Deidre McCloskey, 2010

22 The Maddison-Project, 2013 version, <http://www.ggd.net/maddison/maddison-project/home.htm>

23 Industrial Policy in Europe Since the Second World War: What Has Been Learnt?, Geoffrey Owen, 2012

Whatever the reality, by the 1920s and the national loss of confidence that followed the Great War, politicians in Britain were losing faith in the Victorian simplicity of free trade. In 1932, Joseph Chamberlain's son Neville finally fulfilled his father's long standing mission with the introduction of Imperial Preference and a new general tariff of 10% on goods from outside the Empire.

For the most part however, this second generation of industrial policy focussed more on the efficiency advantages from greater economies of scale and national planning than simple protectionism. Competition, it was thought, was just inefficient. The Governments of the day actively encouraged mergers and cartelisation. By the mid-1930s, half of manufacturing output was produced under a cartel<sup>24</sup> - a process that only accelerated in the post war period with the encouragement of 'national champions' and outright nationalisation in electricity, gas, coal, railways, steel and health. This was followed in the 1960s and 1970s by the creation of new bodies to help the Government take a more active role in planning growth, such as the National Economic Development Council ("Neddy"), the Industrial Reorganisation Corporation, the Department of Economic Affairs and the Ministry of Technology.

Unfortunately, if anything, these policies were counter-productive. Most national champions were a disappointment, with mergers failing to result in efficiency gains, improved export performance, or increased more spending on research. Likewise, nationalisation does not seem to have raised productivity, and industrial subsidies had little sustained effect. By contrast, the limitations on competition did have a significant and negative effect. Abandoning cartels is estimated to have increased productivity growth by 20% in the subsequent decade.<sup>25</sup>

Recognising the failure of this approach, the attempts to create national champions and protect old industries were deemphasised or abandoned from the mid-1970s. The focus turned to horizontal policies such as encouraging venture capital, R&D, and training, together with reforms to competition, tax and trade union policy. This shift was largely a success: significantly increasing productivity and innovation in newly competitively industries – including a doubling or even tripling of productivity in the newly privatised electricity sector.<sup>26</sup> Britain finally began to reverse its post war relative decline, largely catching up with France and Germany by the mid-2000s.

While overall productivity increased, it is impossible to miss the sharp fall in the share of manufacturing that took place over this time period – down from 25% of employment in 1975 to 10% by 2005. The extent to which this was inevitable remains intensely debated. Some, such as Kitson and Michie (2012), argue that Britain experienced an especially fast decline because of deeper structural problems, continued failures in industrial policy and underinvestment by an overly short-termist City. However, the fall in manufacturing employment was if anything still faster in countries which pursued much more activist industrial policies such as France (from 28% in 1975 to 11% in 2005), and Germany (32% to 19%).

While the 'national champion' era may have been a disappointment, over the next two decades two new rationales for industrial strategy were to move into focus that would prove more enduring.

First, overly simplistic free trade models have always struggled to explain the existence of clusters: the tendency of industries to concentrate in a specific area, from financial services in London to movie studios in Hollywood. 'New Economic

24 The British Economy Between the Wars, Barry Eichengreen, 2002, <http://eml.berkeley.edu/~eichengr/research/floudjohnsonchaptersep16-03.pdf>

25 The impact of Government policies on UK manufacturing since 1945, Stephen Broadberry and Tim Leunig, 2013, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/277158/ep2-government-policy-since-1945.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/277158/ep2-government-policy-since-1945.pdf)

26 Factsheet on how competition policy affects macro-economic outcomes, OECD, 2014 <https://www.oecd.org/daf/competition/2014-competition-factsheet-iv-en.pdf>

Geography' models, pioneered by Paul Krugman focussed on the increasing returns to scale that could come from geographically concentrated industries being able to draw on a common pool of infrastructure, skills and ideas. While these clusters historically had often developed organically or by accident, it was recognised that Government could also play a helpful convening role, such as in the case of Canary Wharf. As the modern economy became increasingly urbanised, the state's role in managing successful metropolitan areas such as London or Manchester became hard to avoid.

Second, fears over climate change took on increased urgency, it became clear that market solutions were unlikely to deliver declining greenhouse gas emissions quickly enough on their own. Energy has always been at the forefront of shifts in wider thinking over industrial strategy: first nationalised in the post war era, then after Nigel Lawson's 1982 speech "The Market for Energy" acting as a trailblazer for the introduction of competition, deregulation and privatisation. In 2008, Ed Miliband's speech, "The Rise And Fall And Rise Again Of A Department Of Energy", marked the start of a new era of intervention in energy markets, while the passing of the Climate Change Act made it difficult to avoid taking greenhouse gas emissions into account when making major economic decisions.

The financial crisis led to renewed interest in industrial strategy, revealing the UK's seeming over-reliance on the finance sector to. Under the Coalition, the Government moved in favour of targeting overall regions, sectors and technologies that were seen as especially important to the future of the economy, while still trying to avoid winners in terms of particular companies. Significant powers were devolved to city Mayors, new sector strategies were developed in 11 key industries, and the Government announced its support of 'eight great technologies', from big data to synthetic biology. More recently, new regional growth strategies and agendas have emerged in the form of the 'Northern Powerhouse', the 'Midlands Engine', and the 'South West Growth Charter'.

## Theory and Evidence

So, how well has industrial strategy worked? While it is probably too early to judge the Coalition's initiatives, what can we learn from the broader literature and other international examples?

Almost nobody denies that, in principle, there are good theoretical reasons for state support of public and merit goods such as infrastructure, R&D and skills. Successful new agglomerations and industries can have significant spill-over effects and positive externalities, suggesting they will be under-provided by the market.

Equally, however, a successful industrial strategy has high informational requirements, and sector specific strategies open the door for harmful lobbying and rent-seeking. While many countries or cities are keen to recreate their own Silicon Valley or Mittelstand, the degree to which this is actually possible is far from clear.

Which effect dominates? The positive support of under-funded projects, or the negative effects of political distortion?

Much of the early literature was relatively sceptical of industrial policy. Schultz (1983), for example, a former US chairman of the Council of Economic Advisors and a Democrat economist, argued that "industrial policy is a dangerous solution for an imaginary problem", while the famous World Bank report of 1993 pushed

back against the idea that the East Asian Miracle was specifically down to industrial policy rather than getting the fundamentals right. Overall, a recent critical literature review by Pack and Saggi (2006) concluded, “there appears to be little empirical support for an activist government policy even though market failures exist that can, in principle, justify the use of industrial policy.”

Other economists were more positive, however, stressing that industrial policy could work, but that it was important to be careful about what you promoted. For example, Harrison and Rodriguez-Clare (2010) stress the importance of ‘soft’ industrial policy, such as the promotion of clusters or Special Economic Zones, while discouraging more traditional ‘hard’ policies such as tariffs or subsidies to specific industries.

Unfortunately, empirical evidence is always likely to be inconclusive. Both optimists and pessimists can, of course, near endlessly trade cherry-picked examples of either foresighted government investment or expensive white elephants.

Trying to get more systematic than this is difficult. As Rodrik (2008), one of the leading modern proponents of industrial policy admits, in econometric studies “with few exceptions, industrial policy interventions are either negatively correlated with performance, or not correlated at all.” However, given the shortage of suitable instruments, “existing cross-industry studies are uninformative, and are likely to remain so no matter how much we mess with their specification.” We simply don’t have enough data to say for sure, and instead are forced to rely on wider priors.

**Table 1: Ten Important Papers on Industrial Strategy**

Year	Title	Author	Summary
1776	Wealth of Nations	Smith	Argued that economic systems were capable of operating semi-automatically with minimal intervention. The ‘invisible hand’ of the economy could, however, be impeded by monopolies and the privileging of certain economic groups over others. Trade should move from ‘mercantilism’ towards specialisation based on ‘comparative advantage’.
1791	Report on Manufactures	Hamilton	Favoured manufacturing over agriculture, advocating of state intervention to promote industry. This intervention was necessary to enable initial competition against incumbent industries in foreign countries.
1841	The National System of Political Economy	List	Disagreed with Adam Smith, stating that a country had a responsibility both to current and future generations. Navigation and technology are important to avoid stagnation, hence there is a role for the state in promoting them. Argued that although this was not widely acknowledged, Britain had benefited from both early industrialisation and protectionism.
1983	Industrial Policy: A Dissent	Schultze	Examined industrial policy as the alternative to the neo-classical ideas of supply-side economics ahead of the 1984 Democratic presidential nomination. However, industrial policy may be a ‘dangerous solution for an imaginary problem’.

Year	Title	Author	Summary
1992	Britain's Productivity Gap in the 1930s: Some Neglected Factors	Broadberry & Crafts	Proposed that poor British interwar productivity performance was a result of inadequate human capital, restrictive working practices and collusive agreements among firms. Weaknesses in firm structure have been overemphasised in studies of the period, and more attention should be given to the role of the market in determining business conduct.
2006	The case for industrial policy: a critical survey	Pack & Saggi	An investigation of the rationale for industrial policy to correct market failures preventing industrialisation. Concluded that there appears to be little empirical support for an activist government policy even though market failures exist that can, in principle, justify the use of industrial policy.
2008	Normalising Industrial Policy	Rodrik	Industrial policy has a strong theoretical logic. The case against industrial policy rests upon the difficulty of its implementation. Three key design attributes that industrial policy must possess include embeddedness, carrot-and-stick measures (i.e., not simply subsidising lazy industry) and accountability.
2009	Trade, Foreign Investment and Industrial Policy for Developing Countries	Harrison & Rodriguex-Clare	A broad historical exploration of the proposed benefits of abandoning policy neutrality over trade, FDI and resource allocation – collectively “industrial policy”. Working both theoretically and empirically, differentiates between ‘hard’, price-distorting interventions which are seen to be ineffective, and ‘soft’ policies which deal directly with coordination failures.
2012	Industrial policy in Europe since the Second World War: what has been learnt?	Owen	European industrial policy post-WWII passed through two phases. The first was the creation of national champions deemed essential for the national economic, such as high-tech industries in aerospace and computing, seeking to narrow the ‘technology-gap’ between Europe and the US. From the 1980s, this shifted towards attempts to make the broader environment favourable for business. Industrial policy should be broad and aimed at the wider business environment, promoting competition and innovation and facilitating industrial change.

## Lessons

Every Government has some form of industrial strategy, whether explicitly or implicitly. No Government is completely neutral in its beliefs over the biggest challenges facing the economy, or where the highest returns in investing new resources is likely to arise.

Arguably, from one point of view even Thatcherism can be described as a (highly successful) horizontal industrial strategy to turn around relative decline in the economy, improve productivity, develop new competitive strengths and welcome foreign direct investment. As John Kingman, former Acting Permanent Secretary at the Treasury recently argued, somewhat tongue in cheek, “[the] Big Bang – blowing apart a sleepy oligopoly – [was] a conscious and brilliantly successful act of Government policy, probably the single most successful piece of British industrial policy ever.”

If industrial strategy is unavoidable, that doesn’t mean it was always done well. What take away lessons should we draw from the past?

- 1) **Encourage competition rather than national champions.** The 1930s and post war move away from competition was one of the worst British economic policy mistakes of the twentieth century, leading to substantial harm in terms of productivity and household incomes. As importantly, there is increasing evidence in, for example, Harrison (2013), that strong competition can complement a sectoral policy, and ensure that government subsidy results in greater innovation and more dynamic start-ups, rather than collusion and subsidising monopoly power.
- 2) **Picking winners in some cases is unavoidable – it's stopping the support of losers that matters.** No Government is completely neutral in the decisions it makes over skills, science, procurement or infrastructure. The key is to prioritise policies that can unlock emerging potential, rather than trying to unsustainably tilt the playing field. Equally, much more important than making a perfect plan upfront is having an ongoing process to identify bad bets rather than continually chasing lost sunk costs. 79% of British productivity improvement is estimated to result from between-firm changes – the creative destruction of bad firms exiting the market – rather than internal within-firm changes.<sup>27</sup> Equally, picking promising industries, technologies or sectors is not necessarily any more reliable than picking individual companies. Few people in the 1950s would have predicted that British pharmaceuticals would go on to be such a success story.
- 3) **Regional growth is not a zero sum game.** The 1945 Redistribution of Industry Act largely failed in its attempts to regenerate deprived areas, but it did succeed in cutting off the growth of previously thriving cities like Birmingham. There is no zero sum competition between our major cities. London can be an asset as much as a rival to regions like the Northern Powerhouse and Midlands Engine.
- 4) **Stay outward looking, rather than try to hide behind protectionist barriers.** Britain has much to gain from building on its strengths as a global hub, deriving from its language, heritage, time zone, and as home of the world's greatest metropolis. Trade is important in the short term because of its ability to lower consumer prices – it is estimated that a 10% increase in world tariffs would lower UK GDP by 2.4%.<sup>28</sup> But even more significant are the long term dynamic effects on competition and productivity, which are much harder to quantify.
- 5) **Innovate for the future, rather than trying to return to the past.** No government policy could have held back the relative shrinking of manufacturing during the twentieth century. The attempts to halt the decline in manufacturing distracted from policies that could have developed new economic strengths, or softened the final economic adjustment when it finally came. Equally, a new Industrial Strategy will not just have to fight the last economic war, but take account of wider changes in technology. Over the next few decades, 82% of current jobs in production occupations are expected to become automated. Britain is well placed to thrive in a new more dynamic, creative and human economy, but we won't get there by simply trying to recreate the jobs of the past.

27 Factsheet on how competition policy affects macro-economic outcomes, OECD, 2014 <https://www.oecd.org/daf/competition/2014-competition-factsheet-iv-en.pdf>

28 Protectionism, BIS & DFID, 2011 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/43315/11-718-protectionism.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43315/11-718-protectionism.pdf)

- 6) **Government intervention can be as much the problem as the solution.** Often the barrier to increased efficiency is less defects in the private sector, and more from Government failures to deliver adequate infrastructure, an agile planning system or high quality vocational education.
- 7) **The economy cannot be considered in isolation from wider social and environmental factors.** Expanding the use of cheap coal may give Britain a short-term economic advantage, but is unlikely to be in the best interests of the planet - increasing greenhouse gas emissions and local pollution. In retrospect, much of past industrial policy was focussed on industries with significant negative externalities. At the same time, given that many local labour markets are so dominated by highly concentrated industrial employers, there is some case for short term public support to prevent economic depression– if for no other reason than to ease the transition.

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# Britain's Economic Strengths and Weaknesses

The first step in any strategy is diagnosis – what are your strengths and what are your weaknesses? How is this likely to change moving forward?

Broadly speaking, there are two types of method which could be used to judge the overall performance of the UK economy:

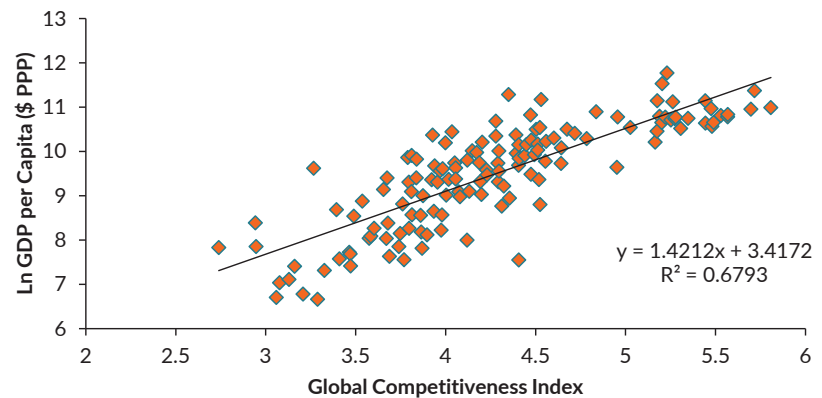
- **Absolute measures** compare Britain's performance against some theoretical production possibility frontier, or a hard metric of growth, productivity or power. As a leading nation, what we really want to know is what is physically possible, not just what has been done by others. In practice, this approach is only possible for a small number of indicators such as GDP per capita or labour productivity.
- **Relative measures** compare Britain's performance to other leading economies. This allows us to more easily take in a much broader array of metrics, including more qualitative measures. For example, the World Economic Forum's Global Competitiveness Index and the Heritage Foundation's Index of Economic Freedom rely heavily on survey evidence as well as harder measures.

While the second sort of measure may seem less scientific, there is good evidence that it can yield meaningful information on the underlying state of the economy. The Global Competitiveness Index, in particular, is strongly correlated with overall GDP per capita (Figure 5). While it would be misleading to take this correlation literally, with causation likely flowing in both directions, this suggests that as a rule of thumb every improvement of the Global Competitiveness Index score by 0.1 is associated with a 17% increase in wealth.

Whatever the methodology, most studies come to a reasonably consistent view of Britain's economic strengths and weaknesses, and one that matches both with intuition and Britain's historical record. Britain is a highly economic competition country – 7th in the latest Global Competitive Index, 10th in the UK Economic Freedom of the World and 10th in the Index of Economic Freedom – but its tax burden is relatively high, and there are many specific areas where it could be doing better (Figures 6, 7, and 8).



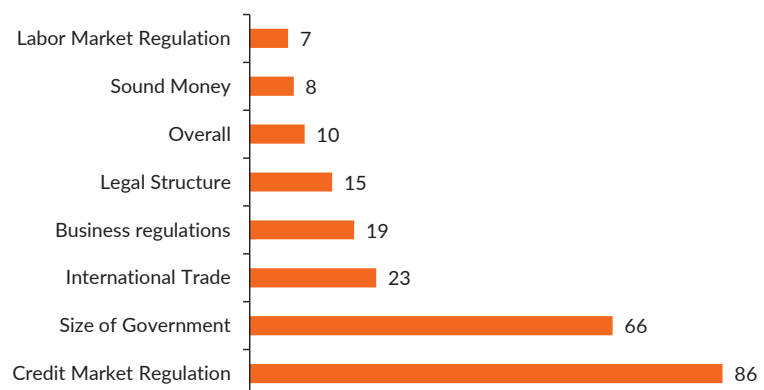
**Figure 5: Correlation between Global Competitiveness Index and GDP per capita**

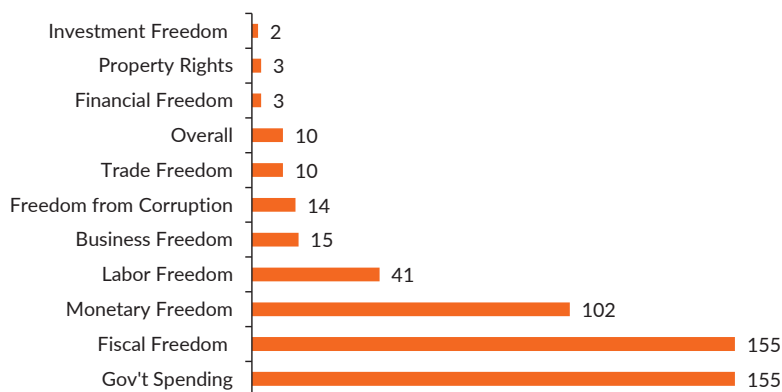


**Figure 6: UK Global Competitiveness Index Rankings 2016-17**



**Figure 7: UK Economic Freedom of the World Rankings**



**Figure 8: UK Index of Economic Freedom Rankings**

## Strengths

According to the IMF, the British economy is the 10th largest in the world in PPP terms, or 20th in per capita terms. Given that Britain remains an enormously wealthy country, unsurprisingly it also retains many significant economic strengths:

- **Culture.** While hard to quantify, few countries can rival Britain for the depth and extent of its cultural and historical connections. The UK is second only to the US in terms of its soft power,<sup>29</sup> while London is listed in most rankings as either first or second, only to New York, in its global influence, power and competitiveness.<sup>30</sup>
- **Services.** The UK has a strong revealed comparative advantage in services, with particular strengths in insurance, finance, business services and telecoms. Britain also thrives in many high end areas of manufacturing with strong crossovers to services and technology, from pharmaceuticals and publishing to computer design and cars (Figure 9).
- **Academia.** Britain is genuinely a world leader in science and development, with the highest proportion (18%) of its total research papers among the top 10% of most cited, and four of the world's top twenty research universities.<sup>31</sup>
- **Regulation.** The UK has one of the most flexible labour markets in the world, which together with innovations in active labour market policy has seen British employment do rather better than even the US in recent decades. Similarly, the UK's product market regulation and competition law is generally rated as one of the world's best.
- **Institutions.** Retaining our own currency, a highly respected legal system and a Parliament able to respond quickly to changing circumstances, Britain enjoys both significant flexibility and credibility on the world stage.

29 <http://softpower30.portland-communications.com/ranking/>

30 For example <https://www.atkearney.com/research-studies/global-cities-index>, <http://www.mori-m-foundation.or.jp/english/ius2/gpci2/>, <http://www.lboro.ac.uk/gawc/world2012t.html>

31 OECD Science, Technology and Industry Scoreboard 2015: United Kingdom, <http://www.oecd.org/sti/UK-CN-EN-Scoreboard.pdf>

**Figure 9: The UK's Most Successful Export Sectors (ITC)**

Category	Type	Total World Exports (£bn)	UK Exports (£bn)	Revealed Comparative Advantage
Insurance and pension services	Service	79.2	18.2	5.9
Works of art, collectors' pieces and antiques	Product	27.5	6.1	5.7
Financial services	Service	267.7	55.4	5.4
Arms and ammunition; parts and accessories	Product	11.6	1.3	2.9
Personal, cultural, and recreational services	Service	25.0	2.4	2.5
Beverages, spirits and vinegar	Product	68.0	6.5	2.5
Printed books, newspapers, pictures etc	Product	28.5	2.7	2.4
Other business services	Service	655.4	61.0	2.4
Natural or cultured pearls, precious or semi-precious stones, precious metals,	Product	401.0	36.0	2.3
Lead and articles thereof	Product	4.4	0.3	2.0
Pharmaceutical products	Product	325.8	23.5	1.9

## Weaknesses

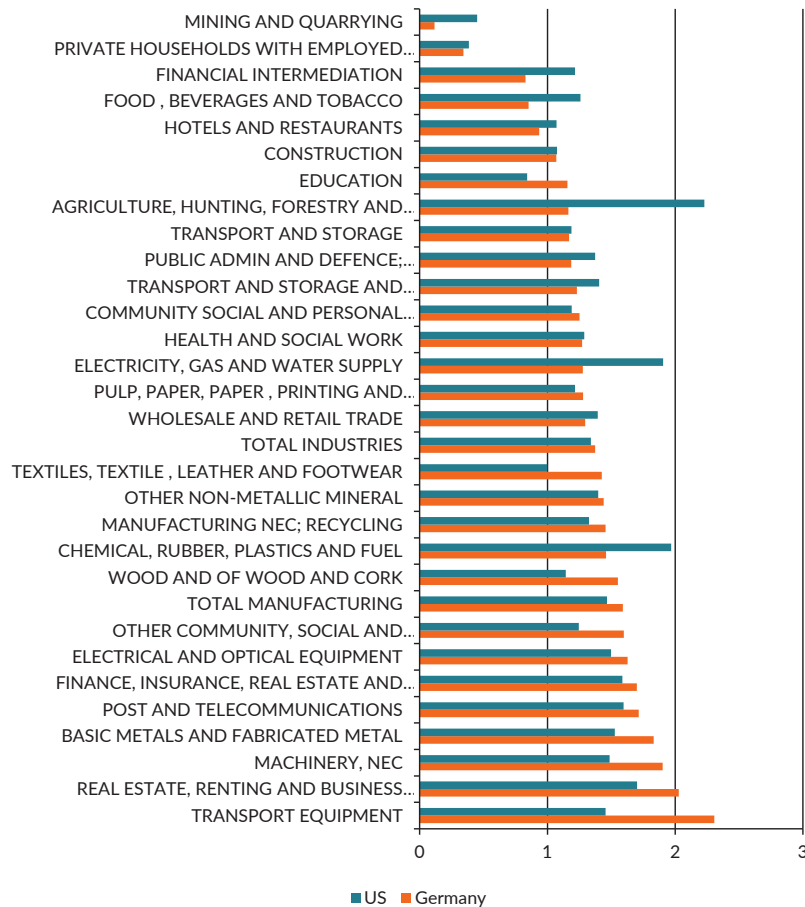
Of course, most commentators also accept that the UK has some significant economic vulnerabilities:

- **Productivity.** While the UK saw strong catch up productivity growth between the 1970s and 1990s, it has almost stagnated over the last decade. Today, the UK only enjoys around 77% of the per hour productivity seen by the US, or 73% on a per person basis. This productivity gap exists widely across industries (Figure 10), suggesting that the problem is more fundamental than the UK simply being too concentrated in declining industries.
- **Commercialisation.** The UK has frequently struggled to turn its scientific leadership into commercial products, with too many companies unable to overcome the 'valley of death' between basic research and commercialisation. Compared to other European countries, the OECD judges the UK only to play a "limited role" in the invention of disruptive technologies.<sup>32</sup>
- **Balance.** Britain remains very reliant on the success of London, in general, and finance, in particular, lacking the more diversified range of strengths enjoyed by countries such as the US or Germany.
- **Skills.** While the UK's elite education is world beating, it does much less well at low to medium level education, and particularly badly in vocational education. Britain is ranked 19th in the OECD for low skills, and 24th for moderate skills, while separate analysis suggests that the UK has the lowest literacy rate and the second lowest numeracy rate of 23 developed nations.<sup>33</sup>
- **Resources.** The UK has limited natural resources compared to a US, China, Australia, or Russia, and this is particularly true as North Sea oil and gas production declines. Since 2004, the UK has once again become a net importer of energy.

32 OECD Science, Technology and Industry Scoreboard 2015: United Kingdom, <http://www.oecd.org/sti/UK-CN-EN-Scoreboard.pdf>

33 The skills we need, and why we don't have them, Jonathan Simons and Tom Richmond, Policy Exchange, 2016, <https://policyexchange.org.uk/publication/the-skills-we-need-and-why-we-dont-have-them/>

**Figure 10: UK Productivity Ratio with Germany and America (UK=1)**



## Opportunities and Threats

Any Industrial Strategy which is purely backwards looking is likely to fail. While the future is always uncertain, a successful new Industrial Strategy will have to take account of underlying major trends that could potentially reshape our future and change current assumptions:

- **Technology.** The continued progress in automation technologies is likely to raise the relative scarcity of creativity and human skills, while diminishing the value of routine clerical or production work. Similarly, new technologies in transport and communications, from self-driving cars to super-fast rail, could fundamentally shift economic geography, in the same way that the rise of the personal computer helped revitalise the city.
- **Stagnation.** Across the G7, measured growth in Total Factor Productivity – the broadest measure of efficiency and innovation in an advanced economy – stagnated in the 2000s. Even before that growth in TFP remained significantly lower than in the post war boom of the 1950s and 1960s. While the root cause remains controversial, some economists, like Robert Gordon, argue that this trend could represent a fundamental slowdown in the rate of innovation,

which itself would have momentous implications for everything from real wages to the sustainability of public services.

- **Globalisation.** Both the Brexit and Trump wins have been interpreted by many commentators as at least partially a result of a backlash against globalisation. After growing strongly between 2001 and 2008, trade as a share of world GDP has yet to take off again.<sup>34</sup> The WTO and World Bank have both warned that we may have reached ‘peak globalisation’, while ongoing multilateral trade deals like CETA and TTIP are looking increasingly vulnerable to political overturn. Given how closely London’s economic success has been linked to the wider success of globalisation, Britain is likely to be especially vulnerable to any global structure shift away from trade and openness.
- **Brexit.** Joining the European Community fundamentally reshaped Britain’s economic structure, accelerating the transition away from manufacturing, increasing competitive pressure and refocusing a significant proportion of trade towards the continent. Leaving the EU is likely to be no less fundamental, and at a more granular policy level, raises the possibility of re-opening many old policy questions, from State Aid to public sector procurement.
- **Climate.** The consensus of scientific opinion is that global temperatures are increasing due to human influence on the climate. Alongside most other nations, Britain has pledged to reduce greenhouse gas emissions to mitigate climate change. Under the Climate Change Act, the UK has committed to an 80% reduction in greenhouse gas emissions by 2050 – a target that is simply impossible with today’s energy and transport infrastructure. Given that the lifespan of major infrastructure can be many decades, Britain has to both avoid getting locked into unsustainable solutions and urgently develop new more cost effective technologies to decarbonise the economy.

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<sup>34</sup> An Anatomy of the Global Trade Slowdown based on the WIOD 2016 Release, Marcel P. Timmer, Bart Los, Robert Stehrer, and Gaaitzen J. de Vries, November 2016, <http://www.ggdc.net/publications/memorandum/gd162.pdf>

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# Developing a modern industrial strategy

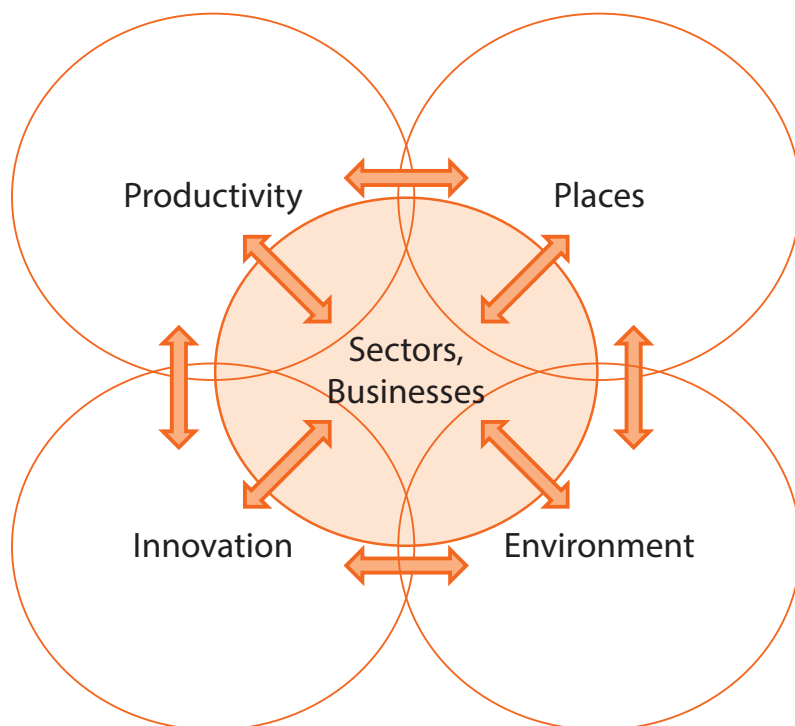
How should a new Industrial Strategy respond to these challenges? How can Britain build on its strengths, address its weaknesses, and position itself best for an uncertain future?

Over the next year, Policy Exchange will be undertaking an extensive programme of work to better understand how to create a modern industrial strategy.

In the rest of this paper, we look in more detail at what we currently know and what we don't about Britain's biggest economic challenges:

- **Productivity:** What are the causes of Britain's low productivity?
- **Place:** Is Britain's economy unbalanced?
- **Innovation:** How can we catalyse innovation?
- **Environment:** How can we ensure that the Industrial Strategy is 'green'?

**Figure 11: The Major Economic Challenges Facing Britain**



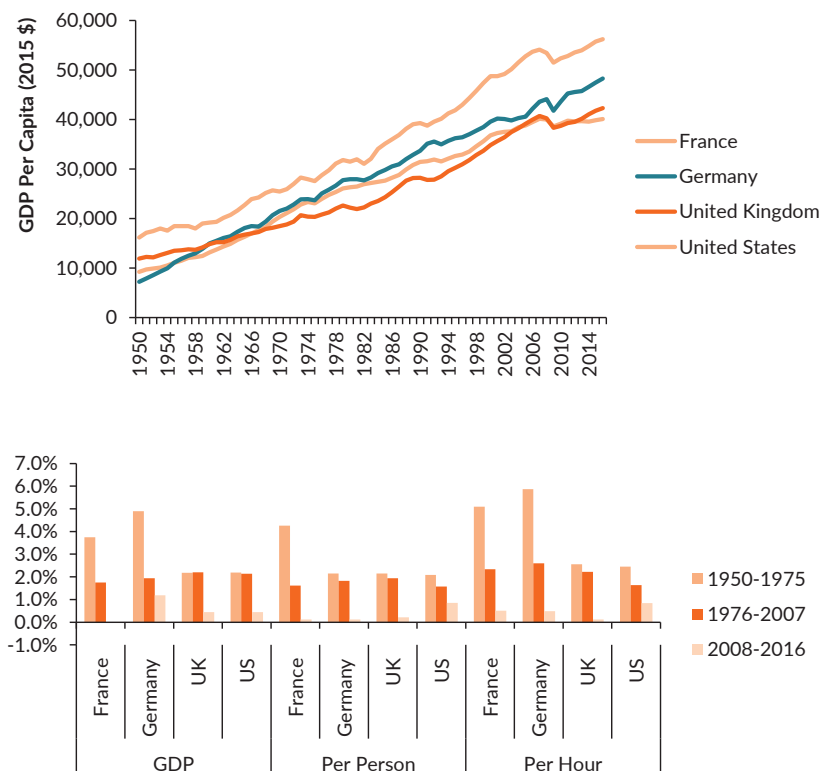
# Productivity: Why has Britain fallen behind?

## Decomposing the Gap

The story of British productivity after the war is one of three eras:

- In the immediate post-war decades, British productivity grew steadily by around 2% a year, but could not keep up with the surging economies of France and Germany, allowing them to overtake the UK.
- The 'neoliberal' Thatcher / Major / New Labour period of 1976 – 2007 saw Britain enjoy strong catch up growth, with the UK finishing the period with output per worker on par with its European peers.
- Since the financial crisis, productivity has largely stagnated, but a strong employment performance has seen overall GDP continue to grow.

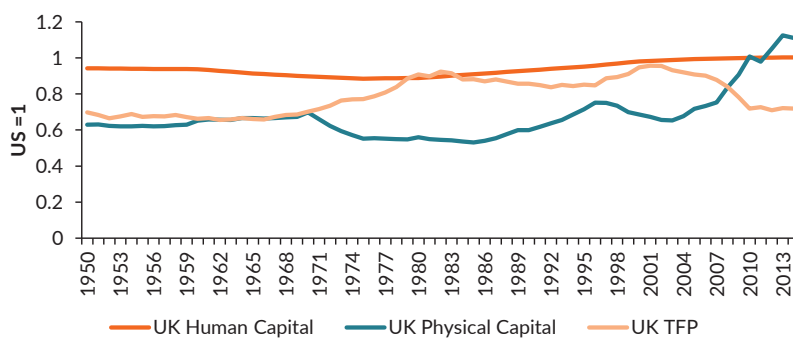
**Figure 12: UK Productivity Gap (Conference Board)**



In reality, Britain has not one productivity gap but four – and they are not all to our disadvantage:

- **The gap in hours worked.** French productivity has often been higher than the UK on a per hour or a per worker basis. However, some of the gap in productivity is down to the UK's higher rates of employment. According to the most recent OECD data, the UK labour force work for 797 hours per person per year, compared to 820 in the US, but just 607 hours in France or 721 hours in Germany.
- **The gap in physical and human capital.** Historically, Britain's labour productivity gap with France and Germany has largely been attributed to Britain's lower stock of physical and human capital. In 2004, for example, Broadberry and Mahoney calculated that 70% of the gap with France was explained by physical capital and 10% by human capital, while with Germany a 314% of the gap was explained by physical capital and 29% by human capital.<sup>35</sup> (Germany's advantages in physical capital were offset by weaknesses elsewhere.)
- **The gap in efficiency.** The gap with the US, however, has always been as much about fundamental efficiency as physical capital – explaining 46% today<sup>36</sup> – and this has only become more true after the drastic fall in whole economy efficiency (TFP) since the financial crisis. The OECD calculates multifactor productivity has shrunk an -0.4% per year since 2008, compared to 0.3% growth in Germany or 0.5% growth in the US. Unfortunately, the reasons for this are still not clear, and neither is it clear how long lasting or persistent this fall is likely to be (“the productivity puzzle”).

**Figure 13: Sources of Productivity (Penn World Table)**



While such cross country comparisons are inevitably crude, the broad conclusion seems reliable: Britain's gap with the US is fundamentally about efficiency and human capital, while physical capital also plays a role in the gap with France or Germany. The UK is an in-between economy, with some of the strengths of both the American and European models. While many focus solely on the traditional, easiest to measure sources of productivity - infrastructure, skills, finance – wider efficiency and innovation potentially play a more important role.

35 Cross-Country Productivity Performance at Sector Level: the UK Compared with the US, France and Germany, Geoff Mason, Brigid O'Leary, Mary O'Mahoney and Kate Robinson, BERR, 2008

36 The Facts of Economics Growth, Charles I. Jones, 2015, <http://www.hoover.org/sites/default/files/jones-facts040.pdf>



## Is the economy working for everyone?

In many areas, the supply side of the UK is not doing too badly:

- Britain has been a world pioneer in encouraging competition. According to the OECD, Britain has the second lightest regulation of product markets, and the third most flexible labour market rules in terms of employment protection for regular contracts.
- The share of British adults with high level skills from tertiary education (43%) is significantly above the OECD average (35%) or that seen in, say, Germany (28%). Even looking narrowly at high level STEM skills, UKCES judges there to be no overall shortage.<sup>37</sup>
- While many complain about a shortage of bank lending to SMEs in particular, the British market does not seem to be doing significant worse than the US or Germany, with most SMEs not considering access to finance a significant concern.<sup>38</sup>

Even investment is less of a problem than it is sometimes made out to be. Gross Fixed Capital Formation in the UK stands at 17% of GDP, slightly less than the OECD average of 21%. However, as a services-focussed economy the UK is also strongly tilted towards intangibles. When you take this into account the shortfall basically disappears, with Britain actually investing more than Germany.<sup>39</sup> The quality of public infrastructure is more of a concern, with Britain ranked just 24th by the World Economic Forum – although the barriers here are as much planning and regulatory, as financial.<sup>40</sup>

However, where Britain has really suffered is a long tail of under-performance:

- Compared to the US, insufficient competition, skill shortages and a legacy of old family firms has left Britain with a long tail of poorly managed firms, with significant knock on effects on average productivity and profitability.<sup>41</sup> While supply side reforms introduced in the 1970s helped at the top, at the bottom Britain still too often suffers from a lack of professionalism or unmotivated management.
- The UK has a high proportion of workers with low level qualifications below secondary attainment (22%) compared to the US (10%) or Germany (13%).<sup>42</sup> Many vocational qualifications have historically been of low quality with little labour market value<sup>43</sup>, while technical adult education is “on the verge of total collapse” with technical post-secondary awards now making up less than 1% of qualifications funded.<sup>44</sup> Even more concerning is the bottom half of existing adult skills, significantly affecting both productivity and social mobility. The UK has one of the largest gaps in literacy and numeracy between those whose parents attended university and those who didn’t finish secondary school – although that said, the US, Germany and France do not do well against this metric either.<sup>45</sup>
- As the 2006 Eddington report emphasised, many of the UK’s infrastructure weaknesses come in small scale projects and pinch points rather than in big new infrastructure commitments. The poor relative impressions of UK infrastructure are mainly related to the state of our roads (rated 27th in the Global Competitiveness Index), whereas the UK actually does rather well in terms of air travel connectivity.

37 Reviewing the requirement for high level STEM skills, UKCES, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/444048/High\\_level\\_STEM\\_skills\\_requirements\\_in\\_the\\_UK\\_labour\\_market\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/444048/High_level_STEM_skills_requirements_in_the_UK_labour_market_FINAL.pdf)

38 SME lending and competition: an international comparison of markets, BIS, 2016, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/522490/bis-16-105-small-and-medium-sized-enterprise-lending.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/522490/bis-16-105-small-and-medium-sized-enterprise-lending.pdf)

39 Look to the intangibles, Jonathan Haskel and Stian Westlake, Free Exchange, The Economist, Feb 20th 2014, <http://www.economist.com/blogs/freeexchange/2014/02/investment>

40 The End of Austerity?: Pre Autumn Statement Briefing, Jonathan Dupont, Policy Exchange, 2016, <https://policyexchange.org.uk/publication/the-end-of-austerity-pre-autumn-statement-briefing/>

41 Measuring and Explaining Management Practices Across Firms and Countries, Nick Bloom and John Van Reenen, 2006, <http://cep.lse.ac.uk/pubs/download/dp0716.pdf>; Constraints on Developing UK Management Practices, BIS, 2011, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/32097/11-1377-constraints-on-developing-uk-management-practices.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32097/11-1377-constraints-on-developing-uk-management-practices.pdf)

42 OECD

43 Review of Vocational Education – The Wolf Report, Alison Wolf, 2011, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/180504/DFE-00031-2011.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf)

44 Remaking Tertiary Education: can we create a system that is fair and fit for purpose?, Alison Wolf, November 2016

45 Survey of Adult Skills, OECD, 2013

Given these problems in the bottom half, it is not surprising that many people feel the modern economy isn't working for them. There are areas of Britain that are truly world class, driving up the average up – it is difficult to complain about London's productivity, skill base or transport connectivity – but other areas have seen a very different picture. The UK also contains 9 of the 10 poorest areas in Northern Europe – areas such as West Wales, Cornwall, Durham and the Tees Valley, Lincolnshire, and South Yorkshire.<sup>46</sup>

On top of this, Britain faces two other challenges to productivity in the near term: Brexit and the “productivity puzzle”.

Most estimates suggest joining the European Union significantly improved productivity by increasing trade, levels of foreign direct investment and effective competition.<sup>47</sup> That doesn't necessarily mean leaving the EU has to reduce competitive pressure – there are other compensating measures policy makers could take, such as ensuring overall levels of tariffs remain low and undertaking ambitious deregulation. But this will not happen automatically, and this is especially true if future policy makers use Brexit as an excuse to make counterproductive changes to rules over State Aid.

Secondly, there is no getting around the magnitude and uncertainty of the recent productivity puzzle. Any long term strategy for productivity will be necessarily incomplete until this is better understood. While as yet no definite culprit has been identified, there are many suspects, including capital misallocation, zombie firms, mis-measurement, labour hoarding, capital-shallowing, weak aggregate demand, and a fundamental slowdown in growth itself. The most recent evidence suggests that slower TFP growth is the leading cause of the initial gap against pre financial crisis trends, but that ongoing slow growth is equally slowed by less intensive use of capital<sup>48</sup> - although both findings raise as many questions as they answer.

**Over the next year, Policy Exchange will be exploring what policy-makers can do to increase productivity and deliver sustainable increases in the standard of living for everyone:**

- **How can we further improve competition policy and regulation to improve the productivity of Britain's underperforming firms and industries?** How do we ensure leaving the EU creates a more, not less competitive economy? What should Britain's rules be about State Aid, and how do we guard against political short-termism? Is there a coherent way to define a 'strategic industry'?
- **How should competition policy take account of the new digital economy?** How should it adapt to a digital world of multinational monopolies, increasing returns to scale and network economics? What can we do to encourage switching in markets like telecoms or energy where consumer engagement seems to be relatively low? Can we make better use of FinTech to drive investment in SMEs and start-ups or smooth out fluctuations in come from a more flexible economy?
- **Is it inevitable that planning decisions for major infrastructure projects will take years, if not decades?** What are the root causes of the delay, and is there anything we can do to reduce them? How can we offset the worst aspects of NIMBYism, whilst ensuring that local stakeholders still have a say? Do we need to look at major reforms to compensation? What can we do to encourage more small scale investment?

46 Source: Eurostat, GDP per capita at NUTS 2 level regions

47 The Growth Effects of EU Membership for the UK: Review of the evidence, Nicholas Crafts, Social Market Foundation, 2016, <http://www.smf.co.uk/wp-content/uploads/2016/04/SMF-CAGE-The-Growth-Effects-of-EU-Membership-for-the-UK-a-Review-of-the-Evidence-.pdf>

48 There are two productivity puzzles, Patrick Schneider, Bank Underground, 17 November 2016, <https://bankunderground.co.uk/2016/11/17/there-are-two-productivity-puzzles/#more-2294>

- **Does Britain face a skills shortage?** In which sectors and locations? If so, what is the fundamental cause? Culture, path dependency in institutions, economics, or something else?
- **How can we encourage a longer-term outlook in both the public and private sectors?** Is the stock market too short term-ist? How reliable are the methods used to estimate long term returns for major projects? Do we need to investigate reforms to corporate governance, or the use of institutional reforms like prediction markets or tournaments?

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# Place: Is Britain unbalanced?

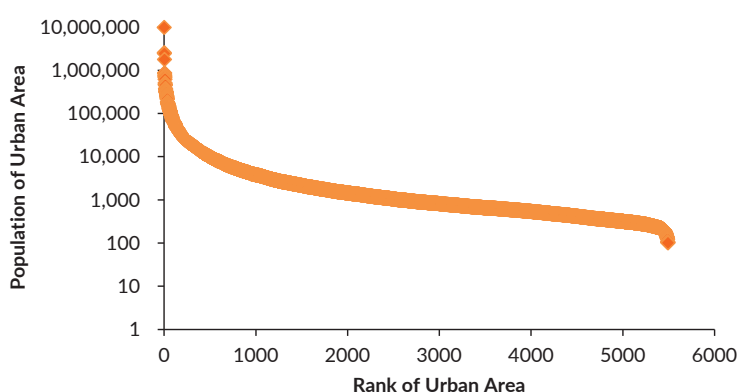
## Is London Too Big?

It is difficult to ignore the inequalities in Britain's places.

A full 28% of the UK's GVA is generated by London, with 56 of the FTSE 100 and one in five graduates choosing to locate there.<sup>49</sup> By comparison, 8% of the US economy, and 18 of the S&P 100 are attributable to New York. In 2015, Westminster alone had 64% more new graduates move to it than the entirety of Manchester. Perhaps unsurprisingly, as a result, average pay in London is 25% higher than the national average.<sup>50</sup>

But the UK is hardly alone in this. No country has an equal distribution of population or economic activity between its cities, or anything close to it. Instead, what you find in every major economy is a power law relationship, with the population of a city inversely proportional to its rank (Figure 14), just as in language, the most popular word ("the") is used almost twice as much as the second ("of").<sup>51</sup> The most plausible explanation for such 'Zipf's law' distribution is that they originate from rich-gets-richer process<sup>52</sup>, while we already know that cities enjoy significant increasing returns to scale, with every doubling in size estimated to increase productivity by 15%.<sup>53</sup>

**Figure 14: Ranked Population of British Urban Areas (ONS)**



Looked at this way, London's size is not unusual - its share of the national economy is exactly in line with the OECD average.

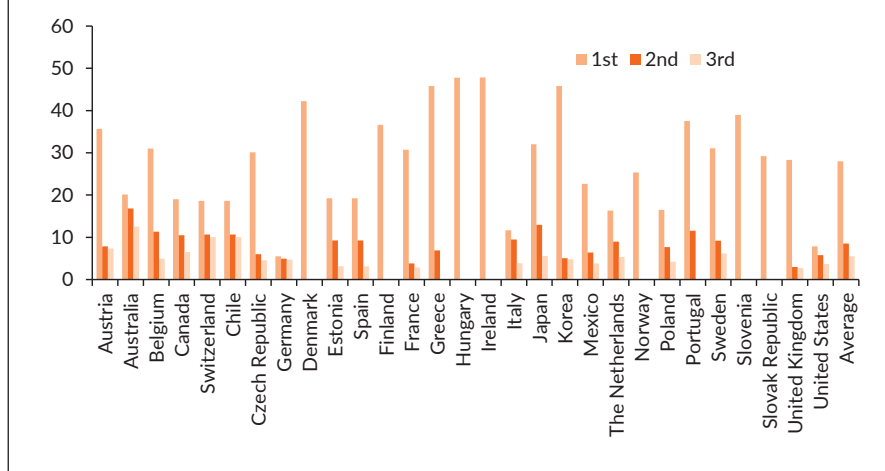
49 What do graduates do?, HECSU, November 2016, [http://www.hecsu.ac.uk/assets/assets/documents/What\\_do\\_graduates\\_do\\_2016.pdf](http://www.hecsu.ac.uk/assets/assets/documents/What_do_graduates_do_2016.pdf)

50 Labour Market Profile – London, nomis, ONS, <https://www.nomisweb.co.uk/reports/lmp/lor/2013265927/report.aspx>

51 English Letter Frequency Counts: Mayzner Revisited, <http://norvig.com/mayzner.html>

52 Technically speaking, there remains an active debate whether the distributions of cities is better explained by Zipf's Law, or a lognormal distribution, which is more likely to be the result of random forces. If the initial distribution of cities is random rather than economically determined, however, that only reinforces the case for investing in Britain's second cities.

53 Why Cities Keep Growing, Corporations and People Always Die, and Life Gets Faster – A Conversation with Geoffrey West, Edge, <https://www.edge.org/conversation/geoffrey-west-why-cities-keep-growing-corporations-and-people-always-die-and-life-gets>

**Figure 15: GDP Share of Top Three Cities (OECD)**

Where Britain is an outlier is in the size of its second-tier cities. Both Birmingham and Manchester make up around 3% of the UK's GDP, compared to the OECD averages whereby second and third cities make up 9% and 5% of the economy respectively. As compared to what you would expect from a purer Zipf's Law, Britain's second cities are too small.<sup>54</sup>

Is this just a statistical anomaly? After all, if cities see increasing returns to scale, doesn't it make sense to sweat our most productive asset and grow London as much as possible?

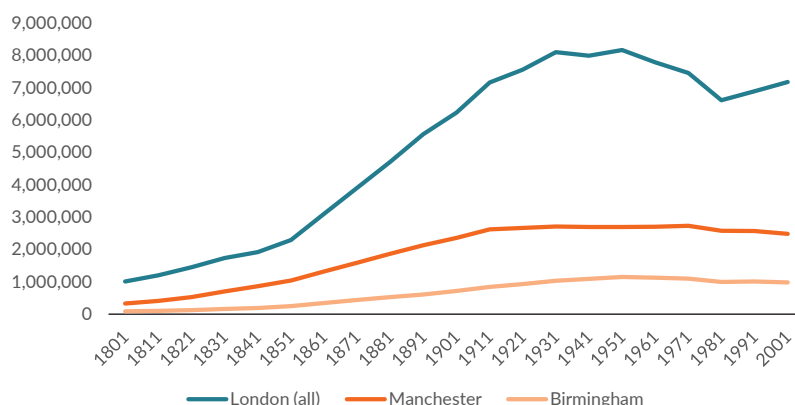
The problem with this line of argument – even if you ignore the potential benefits from risk diversification and reduction in regional inequalities – is that, in practical terms, there is a limit to how big London can get.

London should get bigger, and a significant priority for any Industrial Strategy should be seeing to ease the current constraints that are currently holding it back. Nevertheless, even if every political taboo was broken, the Green Belt built on and new skyscrapers colonised the skyline, it is stretching plausibility that London could ever grow past twice its current 10 million reach, leaving ample room for a number of other thriving metropolitan areas. Even Japan, a country where Tokyo makes up 32% of GDP, with a population density more than twice as high as London, still enjoys a second city twice as big proportionally as Birmingham or Manchester.

### Why Are Britain's Second Cities So Small?

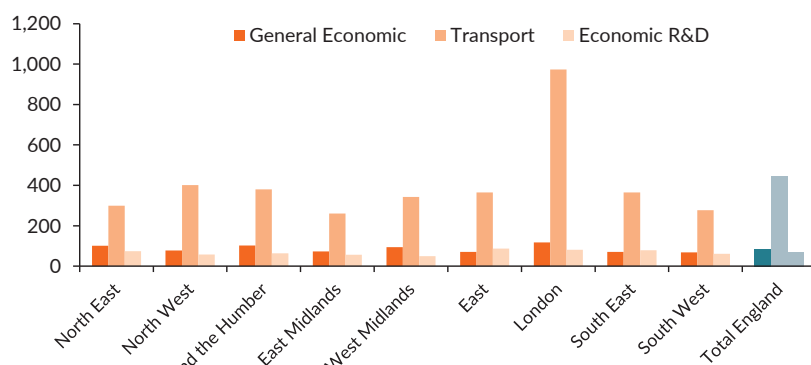
At their heart, most cities grow from some initial seed of political power, an industrial base, educational excellence, or as a trading crossroads. The historical experience of the twentieth century was that industrial monoculture cities like Detroit were vulnerable to disruption to their economic powerbase, whilst more diverse cities built on broader trading or knowledge advantages, were able to pivot. Similarly, Manchester's growth never quite recovered from the decline of Britain's cotton industry after the First World War.

<sup>54</sup> Resurgent Cities and Regional Economic Performance, Henry G. Overman and Patricia Rice, Spatial Economics Research Centre, June 2008, <http://www.spatial-economics.ac.uk/textonly/SERC/publications/download/sercpp001.pdf>

**Figure 16: Historical Population of British Cities (Portrait of Britain)**

But it is too easy to say that relative decline was inevitable. Some old manufacturing cities, like Chicago, have succeeded in making the transition to a knowledge economy, while it is difficult to describe Birmingham, the once ‘city of a thousand trades’, as naturally a monoculture. Given the structural shift towards urbanisation we have seen over the last decades, driven by the rise of services, ICT and highly skilled work, it is striking how the populations of Birmingham and Manchester have stood still.

There are good reasons to suspect that poor policy choices were equally a factor in decline. Many commentators have complained that investment in transport, science and development has systematically under-prioritised the north. In 2015-16, London received 2.8 times more investment per head than the West Midlands in transport or 1.6 times more investment in economic R&D. More fundamentally, an over centralisation of political power made it difficult to co-ordinate local economic growth, skills and infrastructure, while the post war Distribution of Industry Act not only cut off Birmingham’s growth, but arguably created an unhealthy over reliance on the car industry.<sup>55</sup>

**Figure 17: Identifiable Expenditure per Head in 2015-16 (HMT)**

55 Cities Outlook 1901, Naomi Clayton & Raj Mandair, Centre for Cities, 2012, <http://www.centreforcities.org/wp-content/uploads/2014/08/12-07-11-Cities-Outlook-1901.pdf>

The Distributions of Industry Act is an acute example of the constraints that have been created by Britain's planning system. While most people are now aware of the negative effects planning has had on the housing market in London and the South East, its true impact is much broader than this. Overly restrictive planning has accelerated the decline of manufacturing, significantly hurt overall competition and productivity (reducing retail productivity by an estimated 25% since the 1980s<sup>56</sup>), held back social mobility, and redistributing income from young to old, poor to rich.

Most relevantly, it led to a situation where in 2004 the cost of office space was 44% higher in Birmingham than in Manhattan.<sup>57</sup> It is difficult enough to transition into a knowledge economy, without start-ups facing the same costs as in New York.

The good news is that the more the decline of Britain's second cities was a mistake rather than fundamental shift, the more potential there is to reverse it.

Many commentators fall into the trap of seeing the competition between cities as a zero sum game. In reality London is much as an asset as a rival to other cities, allowing other areas to build off its strengths. The UK is fundamentally fortunate in its geography - no other G20 economy has an average distance between its three largest cities of only 195 miles. As new technologies like high speed rail, superfast transit and self-driving cars expand the reach of our transport systems, Britain has a unique opportunity to draw its urban economies ever closer to something approaching a super agglomeration.

However, we should not be under any illusion that this will be easy, or a short term project. Urban regeneration has been an explicit aim of Government policy since the 1940s, and so far, it has largely been a failure.<sup>58</sup> Of the 14,740 studies considered by the Government's What Works Centre for Local Economic Growth project, just 92 or 0.6% were able to find reliable evidence of a policy creating a positive employment impact.<sup>59</sup>

At the heart of any revitalisation effort will be the devolution of further significant powers to cities, local authorities and mayors. Decisions taken locally are likely to lead to better outcomes - particularly in skills, public services and infrastructure, while allowing local areas to make their own trade-offs avoids the impression that Whitehall is forcing difficult choices upon them. Britain remains one of the most centralised countries in the developed world, with only 14% of what Local Government spends raised locally, compared to a European of 37%.

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56 Evaluating the Effects of Planning Policies on the Retail Sector: Or do Town Centre First Policies Deliver the Goods?, Paul Cheshire, Christian A. L. Hilber, Ioannis Kaplanis, 2011

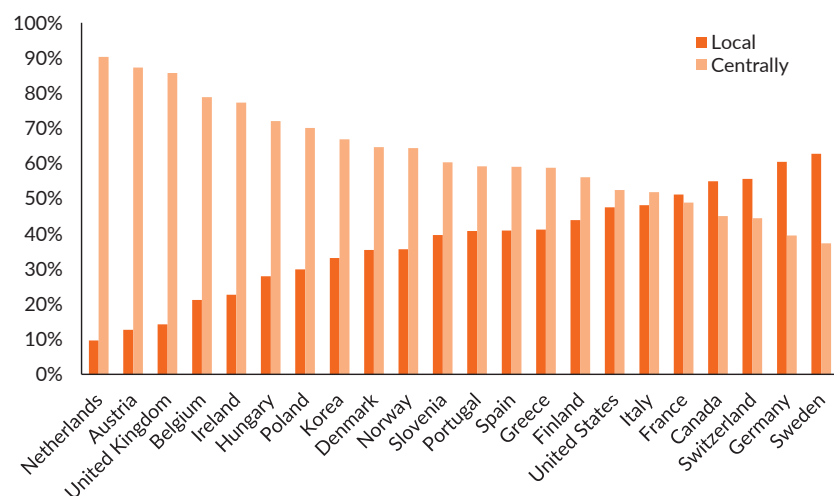
57 Office space supply restrictions in Britain: the political economy of market revenge, Paul Cheshire and Christian A.L. Hilber, 2008, [http://eprints.lse.ac.uk/4372/1/Office\\_space\\_supply\\_restrictions\\_\(LSERO\\_version\).pdf](http://eprints.lse.ac.uk/4372/1/Office_space_supply_restrictions_(LSERO_version).pdf)

58 Cities Limited, Tim Leunig & James Swaffield, Policy Exchange, 2007, <https://policyexchange.org.uk/publication/cities-limited/>

59 <http://www.whatworksgrowth.org/blog/three-years-on-the-state-of-our-evidence-base/>

60 Is fiscal decentralization harmful for economic growth? Evidence from the OECD countries, Andrés Rodríguez-Pose and Roberto Ezcurra, 2010, <http://joeg.oxfordjournals.org/content/11/4/619.full>

**Figure 18: Revenue Raised and Spent in Local Government (Eurostat)**



However, political devolution is unlikely to be a panacea by itself.

The empirical evidence on the relationship between devolution and growth is mixed, with multiple papers finding either no or even a negative link. A recent cross OECD comparison by Rodriquez-Pose and Eczura (2010), for example, finds a significant negative relationship between fiscal decentralisation and growth.<sup>60</sup> Another study on the impact of devolution in Scotland and Wales is also underwhelming for devolutionists – there is little evidence that any economic dividend has emerged from these devolution agreements.<sup>61</sup>

Other papers such as Gemmell et. al. (2013)<sup>62</sup> or Rodriquez-Pose and Kroijer (2009)<sup>63</sup> have found more positive results, but crucially only for devolution of tax raising powers, while localising spending remains negatively correlated. As a recent literature review by Martinez-Varquez et al. (2016)<sup>64</sup> warns, ultimately the econometric results are not robust, with a shortage of external instruments making it difficult to overcome endogeneity.

In general, what we can say, is that devolution is likely to be most helpful when it starts from a very low base – as is clearly the case in Britain – and when rights are matched to responsibilities, with devolution of tax powers going along with expenditure. While the current and last Government have gone some way to giving the nations and regions further tax powers, there is still clearly a long way to go. At present, local councils are still forced to hold referendums on raises in council tax that central government deems ‘excessive’, while the majority of taxes, benefits, minimum wages and public sector pay rates remains centrally controlled.

This matters not just because of the incentives it creates for local government, but for the wider effect on local labour markets too.

Ultimately, while there is room for more than one city in the British economy to thrive, it is not realistic that every town can or should be a world leader. Britain's highly centralised system of uniform rates for public sector pay, minimum wages and benefits is systemically driving up labour costs in many areas beyond sustainable levels, pricing many people out of employment and accelerating the

61 In Search of the ‘Economic Dividend’ of Devolution: Spatial Disparities, Spatial Economic Policy and Decentralisation in the UK, Pike et al., 2010, <http://eprints.lse.ac.uk/33560/1/sercdp0062.pdf>

62 Fiscal Decentralisation and Economic Growth: Spending versus Revenue Decentralization, Norman Gemmell, Richard Kneller, Ismael Sanz, 2013

63 Fiscal Decentralization and Economic Growth in Central and Eastern Europe, Andrés Rodríguez-Pose and Anne Krøijer, 2009

64 The Impact of Fiscal Decentralisation: A Survey, Jorge Martinez-Vazquez, Santiago Lago-Peñas, Agnese Sacchi, 2016, <http://infogen.webs.uvigo.es/WP/WP1505.pdf>



process of de-marketisation. Many areas are becoming increasingly reliant on welfare and public sector employment. This will only get worse with the planned aggressive rises in the National Living Wage, which already has a ‘bite’ of 80% for Britain’s 20 poorest constituencies. The median local wage in the 20 poorest constituencies is only about a quarter higher than the legislated minimum.<sup>65</sup> In the long term, we will have to do a better job of increasing the flexibility of local labour markets, and creating transport links between cities. Increasing average commutes by only 20 minutes would substantially raise the employment reach of Britain’s major cities.<sup>66</sup>

**Over the next year, Policy Exchange will be exploring what policy makers can do to encourage thriving regional economies across Britain:**

- **How can we accelerate the growth of cities and areas outside the South East?** What has caused the relative decline of Britain’s second cities, and what can be done to reverse this? How can we take advantage of differing local circumstances, and design customised industrial strategies appropriate for each location? What role does devolution play, and what is the right balance in this between responsibility and redistribution? What new powers should be devolved?
- **How do we take better advantage of the economic strength of London and the South East, and reduce the constraints holding it back?** Should our priority be brownfield development, reform of the Green Belt, or seeking to build more high rise? How can we better link London with other cities, and share out its prosperity? What wider reforms of the planning system are needed to create a more flexible economy?
- **How do we encourage prosperity outside major cities?** How can we build better transport links to our major cities, and encourage higher productivity outside urban areas? How can we do a better job at supporting and transitioning areas where concentrated industries are in long-term decline? To what extent have some local areas in Britain suffered from de-marketisation, and what can be done to reverse this?

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65 ONS

66 On the Move: How to create a more mobile workforce, Damian Hind, Policy Exchange, Aug 17 2015, <https://policyexchange.org.uk/publication/on-the-move-how-to-create-a-more-mobile-workforce/>

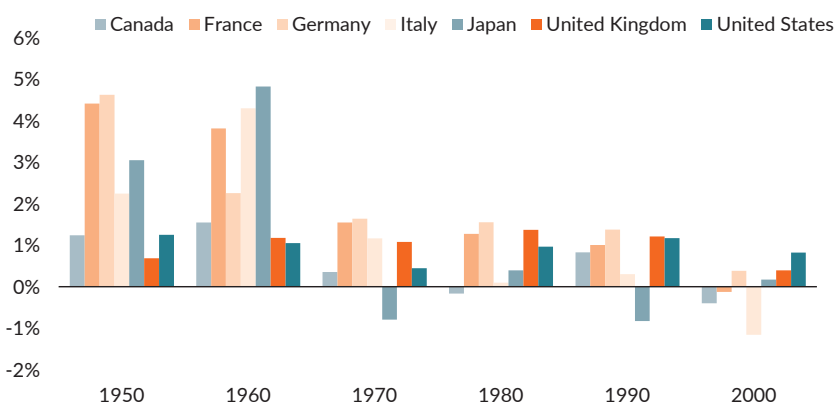
# Innovation: Is it slowing?

## Is Growth Over?

The world economy has a problem. In the long run, the most important source of improving wages, equality and living standards is greater innovation and efficiency. For a modern economy at or near the frontier like the US or Britain, innovation as measured by TFP explains 80% of long term growth.<sup>67</sup>

But TFP is falling. Since the 1950s, the decade average for TFP growth in the OECD has fallen from 2.5% to 0% in the 2000s. Some of this represents post war catch up on the continent – TFP growth was never as high in the UK and US – and a (hopefully) one off financial crisis. However, as productivity continues to stagnate across advanced economies, it is growing increasingly difficult to deny that there might be a problem. While Britain's unique gap with its peers is a shame, what is really worrying for the long term prospects of the world – and of course Britain itself - is the possibility of a long term decline in innovation.

**Figure 19: Average TFP Growth by Decade (Penn World Tables)**



Some, such as economist Robert Gordon, argue that this is what we could be seeing. What if the surge in modern growth was a one time only event, with the world economy now facing ever diminishing returns as all the low hanging fruit has already been picked? The fruits of the 'third Industrial Revolution' (computers, internet, smartphones), Gordon argues, have not been as revolutionary as those of the second (electricity, internal combustion engines, household plumbing, telephones, television).<sup>68</sup>

A recent working paper by Bloom et al. (2016) finds worrying evidence that this might be true. Good new ideas are becoming harder to find in every industry they study, and overall progress is only being maintained by exponential increases

67 The Facts of Economic Growth, Charles I. Jones, 2015, <http://www.hoover.org/sites/default/files/jones-facts040.pdf>

68 Is U.S. Economic Growth Over? Faltering Innovation Confronts the Six Headwinds, Robert J. Gordon, 2012, <http://www.nber.org/papers/w18315.pdf>

in spending on R&D. While Moore's Law –the doubling of transistor density on computer chips every two years –has remained steady for nearly fifty years, this has been achieved by employing 25 times more researchers today than in 1970s.<sup>69</sup>

Peter Thiel, billionaire venture capitalist and newly appointed member of President-elect Trump's transition team, agrees. Instead of physics, however, he blames the political system. Many people are dissatisfied with the state of the economy because they feel in some crucial way Western societies have regressed since the post-war era. We no longer have the confidence and freedom that developed supersonic flight, nuclear power or put a man on the moon. Not unreasonable 1950s expectations of future technological progress, based on the experience of change in the first half of the century, have proved startlingly over optimistic ("We wanted flying cars, instead we got 140 characters.")

The dystopian visions of Gordon and Thiel go too far. There are good reasons to believe that much of the apparent slowdown in innovation is an artefact of our systems of measurement. National statistics designed in 1930s struggle to deal with the increasingly intangible and non-monetised nature of modern economies.<sup>70</sup> Despite the dismissal by Gordon of new technologies like the smartphone, revealed preference suggests that many people in developing nations do find the phone more important than old advances like indoor plumbing.<sup>71</sup> In Britain, the average person checks their phone within 15 minutes of waking up<sup>72</sup>, before going on to spend 160 minutes a day on it.<sup>73</sup> While the data may show that TFP is stagnant, the last ten years have still brought us, among other things: the iPhone, CRISPR, Uber, AirBNB, the Tesla Model S, SpaceX's Falcon 1, the Oculus Rift, consumer drones, and AlphaGo.

Nevertheless, it is hard to deny that we have seen less progress in the worlds of atoms and molecules than bytes and words.

One explanation for this is simple physics. The reason that the speed of our transport has stagnated is that trying to go ever faster runs into the super-linear effects of air friction and energy demand, while the search for new drugs gets more exponentially more difficult as the molecular size of the drugs involved grows. Inevitably, there is always a trade-off between minimising risk and achieving reward, and as societies have grown richer we have chosen to emphasise the former.

But equally there are other reasons to think that the slowing of innovation in the physical world is as much to do with regulation as maths. While the effects are sometimes only visible in the long run, there appears to be a consistent statistically negative relationship between TFP growth and regulation.<sup>74</sup> While it is true that Britain and America are lightly regulated compared to other European countries, in absolute terms the burden of regulation is still growing.

More specifically, we know that it was regulation, not physics, that doubled the cost of non-commercial clinical trials after the arrival of the Clinical Trials Directive, created an effective ban on GM crops, and slowed the introduction of fracking. Even the failure of Concorde and commercial supersonic flight, the poster child for technological overreach, was arguably as much about excessive regulation as physical limitations.<sup>75</sup>

69 Are Ideas Getting Harder to Find?, Nicholas Bloom, Charles I. Jones, John Van Reenen, Michael Webb, 2016, <http://web.stanford.edu/~chadj/IdeaPF.pdf>

70 Independent Review of UK Economic Statistics, Sir Charles Bean, 2016, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/507081/2904936\\_Bean\\_Review\\_Web\\_Accessible.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507081/2904936_Bean_Review_Web_Accessible.pdf)

71 The dreaded 'innovation and toilets' trope, Stian Westlake, Nesta, 2013, <http://www.nesta.org.uk/blog/dreaded-innovation-and-toilets-trope>

72 There's no place like phone, Deloitte, 2016, <http://www.deloitte.co.uk/mobileUK/assets/pdf/Deloitte-Mobile-Consumer-2016-There-is-no-place-like-phone.pdf>

73 Smartphones Drive Increased Time Spent with Digital Media for UK Adults, eMarketer, April 27 2016, <https://www.emarketer.com/Article/Smartphones-Drive-Increased-Time-Spent-with-Digital-Media-UK-Adults/1013884>

74 Regulations and productivity: Long run effects and nonlinear influences, Sotiris K. Papaioannou, 2106 <http://www.sciencedirect.com/science/article/pii/S0264999316304266>

75 Make America Boom Again: How to Bring Back Supersonic Transport, Eli Dourado and Samuel Hammond, Mercatus Research, 2016

## The Innovation Economy

Brexit offers the potential for Britain take up a new world role as a pioneer for innovation. While on the face of it this may seem ambitious, it is not actually that far a stretch goal. Britain is already third in the world for innovation according to the Global Innovation Index, behind only Switzerland and Sweden.<sup>76</sup>

Britain combines world leading science, liberal regulation, financial expertise and international connections:

- Britain ranks first for citation of research<sup>77</sup>, second in the world for the number of Nobel laureates, and has four of the world's top ten universities.<sup>78</sup>
- While excessive use of the precautionary principle remains a problem, in the last few years Britain has been gaining a reputation for friendliness towards permissionless innovation, with new regulatory innovations such as the FCA's regulatory sandbox.
- London is already the world's leading financial centre, and there are promising signs that this lead is being extended into the new era of FinTech.
- No other country has the depth of cultural, geographical and historical international connections as Britain. Brexit offers the opportunity to change priorities in our immigration system, making it easier to attract the best talent from outside Europe.

Nevertheless, if we want to make a success of it, Britain will have to not just come up with new ideas but overcome its longstanding struggles to commercialise new research and create new companies. At present, only six of the 177 tech unicorns, or start-ups valued over \$1 billion, are located in the UK. British companies still seem to struggle to overcome the 'valley of death' between prototype and principle, and many high-risk science-based firms have found it difficult to raise capital on the UK markets. Just 41% of the UK's total R&D funding is spent on development and commercialisation, compared to 62% in the US.<sup>79</sup> Greater public spending on development is unlikely to be enough by itself, however, to catch up with America. In recent decades even Germany has struggled to convert early-stage science-based firms into new global giants, finding itself instead reliant on old established firms.

Innovation is the best chance to revitalise pride across Britain. But new industries will need to benefit not just Shoreditch and King's Cross, but the rest of the country too. That means getting better in the worlds of atoms and molecules as well as bytes and words. As the lines between high end services, technology and manufacturing blur, Britain has an opportunity to develop new manufacturing specialities. But this is unlikely to happen without flexible regulation and sufficient funding.

**Over the next year, Policy Exchange will be exploring what policy makers can do to turn Britain into the most innovative economy in the world:**

- **How can we better enable disruptive innovation?** What evidence is there on the impact of regulation on growth? How can regulators adapt to and encourage disruptive innovation in their markets? How can policy-makers and regulators better balance risk and reward? Can regulators get ahead of disruptive innovation, rather than wait to be challenged in court? How can we help those who find old careers lost in the transition to new types of work?

<sup>76</sup> <https://www.globalinnovationindex.org/gii-2016-report>

<sup>77</sup> International Comparative Performance of the UK Research Base – 2013, BIS, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf)

<sup>78</sup> <http://www.topuniversities.com/university-rankings/world-university-rankings/2016>

<sup>79</sup> OECD

- **How can we use the opportunity of Brexit to move away from the precautionary principle, and unleash British science?** What opportunities are there in pharmaceuticals, medtech, agriculture or energy? Is there a way to target research priorities without fundamentally undermining the independence of science? How do you allow universities to attract the best talent from across the world, while meeting popular concerns over immigration control? How can R&D tackle the biggest problems in the world, from antimicrobial resistance to developing cheaper low carbon forms of energy? What should the role of the new Industrial Strategy Challenge Fund be? How should the additional £2 bn a year in funding for R&D announced at the Autumn Statement be spent? How can we take advantage of the unified UK Research and Innovation to better link up science and start-ups?
- **What should we do to better support the commercialisation of basic research and overcome the ‘valley of death’?** How can Government support new technologies, creating supportive platforms of science, skills and regulation? How can large institutional investors be induced to support science-based firms as they move from business angels and venture capital to the public markets? Why do so few British scientists start companies compared to their counterparts in the US, and why do so many promising firms sell out to larger companies before they have reached their full potential? How can Britain make up for the relative small size of its market compared to an America? How do we create a tax system that is “profoundly pro-innovation”? Should we build a British DARPA, create an ambitious series of new prizes or significantly raise the R&D budget?

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# Environment: Developing a Green Industrial Strategy

The economy does not operate in a vacuum, but within an environmental ecosystem consisting of natural assets and resources. Businesses consume these natural resources as inputs, and discharge waste and pollution back to the environment. In the absence of Government intervention, the short term market equilibrium will often be for firms to pollute and use natural resources unsustainably, without thinking about longer term consequences. Firms are not exposed to the negative externalities which arise from their activities – such as pollution or greenhouse gas emissions, and therefore have little or no incentive to reduce them. Conversely, firms have an incentive to use up ‘common pool’ resources at an unsustainable rate – for example over-fishing to the point where stocks are depleted. Firms tend to under-invest in clean technologies and associated research, in part due to the fact that they are unlikely to capture the full economic and environmental benefit from their investment.

The most pressing contemporary environmental concern is that of climate change. The Stern Review identifies climate change as ‘the greatest and widest-ranging market failure the world has ever seen’.<sup>80</sup> The World Economic Forum (2016) identifies the ‘failure to mitigate and adapt to climate change’ as the most impactful global risk.<sup>81</sup> In most cases, climate change does not pose an immediate threat to business operations, but does present a longer term threat to the economy. There is still considerable uncertainty about the precise nature and extent of climate change impacts in the future – but this should not be used as an excuse for inaction. The UK is already beginning to experience the effects of climate change in the form of rising sea levels, and an increased frequency of severe storms.<sup>82</sup> Looking forward, the biggest climate change risks to the UK are identified as: flooding and coastal change, heatwaves, water shortages, risks to ecosystems and biodiversity, and risks to food production and trade.<sup>83</sup>

The UK has made a strong commitment to reducing greenhouse gas emissions in order to mitigate climate change – in fact the UK is seen as a global leader in this regard. Under the Climate Change Act, the UK Government has set an ambitious target to reduce greenhouse gas emissions by 80% by 2050 (compared to 1990 levels). This commitment sits within the context of the Paris Agreement, under which global leaders have committed to limiting global warming to no more than 2.0°C above pre-industrial levels (with an ambition to limit warming to 1.5°C or less). This is an extremely ambitious commitment, particularly given that global average temperatures have already increased by 1.0°C. In order to deliver the Paris commitment, global greenhouse gas emissions would need to peak before 2020, decline sharply by 2030, and fall to ‘net zero’ during the second half of the century.

80 The Economics of Climate Change, Nicholas Stern, 2006

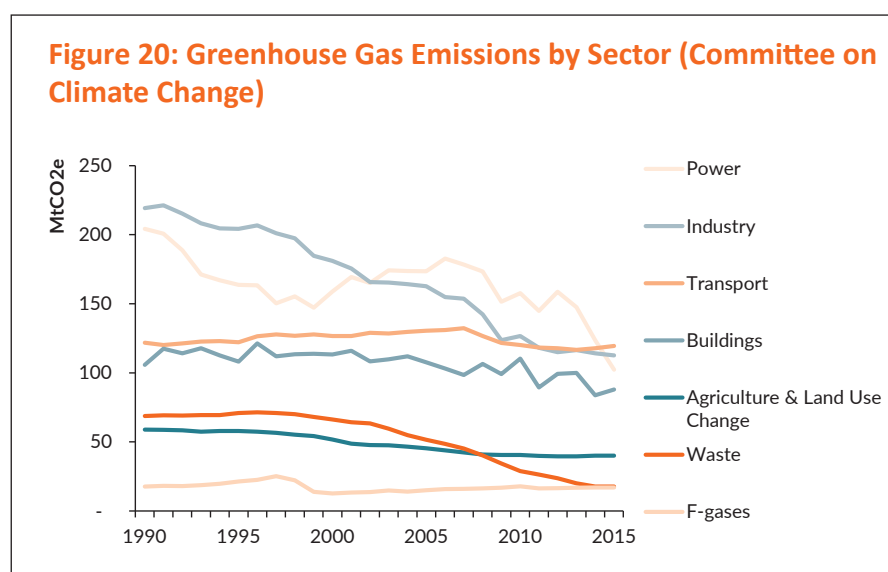
81 <http://reports.weforum.org/global-risks-2016/global-risks-landscape-2016/#landscape>

82 UK Sea Level, DECC, 2013; UK Climate Change Risk Assessment 2017 Synthesis report: priorities for the next five years, CCC, 2016

83 UK Climate Change Risk Assessment 2017 Synthesis report: priorities for the next five years, CCC, 2016

The UK has already made strong progress, reducing greenhouse gas emissions by 38% since 1990. Progress to date has been quite uneven – total greenhouse gas emissions from the power and industrial sectors have fallen by around 50% since 1990, whilst transport emissions have fallen by just 2% (Figure 19). The Government recently reaffirmed its commitment to phase out all remaining coal power stations by 2025.<sup>84</sup> However, far more needs to be done to achieve the decarbonisation trajectory set out in the Climate Change Act and associated Carbon Budgets. For example, the UK has made relatively little progress in decarbonising the way we heat our homes, as discussed in our recent report, *Too Hot to Handle*.<sup>85</sup> Achieving the UK's carbon goals will require a transformation of our infrastructure – in particular transport and energy systems, and buildings. **This infrastructure challenge needs to be considered as a core part of the industrial strategy.**

**Figure 20: Greenhouse Gas Emissions by Sector (Committee on Climate Change)**



Whilst climate change is clearly of great importance, there are also a host of other significant environmental risks. The World Economic Forum (2016) identifies water crises, biodiversity loss, and ecosystem collapse as amongst the greatest global risks. Air pollution is also a significant concern within a UK context - it is estimated that exposure to outdoor air pollution has a health impact equivalent to 40,000 deaths per year across the UK<sup>86</sup>, including 9,400 deaths per year in London.<sup>87</sup> The UK Government has made a commitment to be “the first generation to leave the natural environment in a better state than it inherited”, and will deliver this through a new 25 year plan for the environment.

**In order for the Industrial Strategy to be successful and sustainable, it must take a long term view of resource and environmental concerns. The Government needs to ensure that economic growth goes hand in hand with the protection of natural assets, sustainable use of natural resources, and climate change mitigation and adaptation.** This should not be seen as putting a limit on growth, but as part of a sensible strategy to maximise the benefits and minimise the costs of transitioning to a lower carbon and more environmentally benign economy.

84 <https://www.gov.uk/government/news/government-sets-out-plans-to-upgrade-uk-energy-infrastructure-and-increase-clean-energy-investment>

85 *Too Hot to Handle?*, Richard Howard and Zoe Bengherbi, Policy Exchange, 2016

86 *Every breath we take: the lifelong impact of air pollution*, RCP, 2016

87 *Up in the Air: Part 1*, Richard Howard, Policy Exchange, 2015

## How should a green industrial strategy be defined?

Many business and environmental groups are now supportive of the idea that the new Industrial Strategy should be a ‘green’ Industrial Strategy.<sup>88</sup> Indeed the creation of the new department for Business, Energy and Industrial Strategy (BEIS) provides the opportunity to join up thinking and policies concerning business, industrial policy, energy and climate change, which were previously managed by separate departments. BEIS will need to manage the synergies and trade-offs between these various agendas.

However, there is much less of a consensus on exactly what a ‘Green Industrial Strategy’ means in practice, or how it should be defined.

In general, past approaches to industrial strategy and policy have tended to largely overlook environmental considerations. Indeed, the Industrial Revolution itself was inextricably linked to an expansion in ‘modern’ forms of energy such as coal, as opposed to traditional, renewable sources of energy (such as human and animal traction, wood, windmills and water mills). Broadly speaking, the period of economic growth since pre-industrial times has been associated with “the rapid development of new energy-using activities, for which new forms of energy have been used.”<sup>89</sup> Total energy use in the UK is around 50 times greater than it was in 1820, due to an eight-fold growth in energy use per capita, and a six-fold growth in population.

That said, academic literature suggests that there is often an inverted U-shape relationship between income and environmental damage, or carbon emissions. The so-called ‘Environmental Kuznets Curve’ postulates that as a country industrialises and income levels increase, environmental damage tends to increase initially and then flatten off or decline as the country achieves a given level of wealth. The energy and carbon intensity of the global economy (e.g. carbon emissions per unit of GDP) actually peaked in 1913, and has been in decline ever since.<sup>90</sup>

Where industrial policy has considered green issues, it has tended to focus on how to boost ‘green jobs’ in specific low carbon and environmental sectors, rather than greening the economy more generally. For example, former Energy Secretary Chris Huhne suggested that ‘renewable energy will deliver a third industrial revolution’.<sup>91</sup> The Coalition Government developed strategies for specific sectors such as offshore wind and nuclear.<sup>92</sup> Prior to this the Low Carbon Industrial Strategy (2009) focused on a wider range of sectors including marine energy, carbon capture and storage, ultra-low emission vehicles, and low carbon buildings.

This sectoral approach can in some cases be successful in bringing together public and private sector organisations to address sector-wide challenges. For example, the Offshore Wind Industrial Strategy played an important role in reducing the cost of offshore wind projects through a number of research projects and sector-wide initiatives. However, the drawback of these sectoral approaches is that Government has tended to become heavily involved in ‘picking winners’ and supporting particular sectors or technologies at substantial cost to consumers and taxpayers. For example, the rollout of renewable energy since 2000 has been funded through subsidies, which are projected to increase to £11.4 billion per year by 2021/22.<sup>93</sup> These subsidies are funded through levies on energy bills, which increase energy costs both for households and businesses. There is a danger that policies targeted at increasing the number of ‘green jobs’ may indirectly

88 For example see: <https://greenallianceblog.org.uk/2016/08/04/five-things-you-should-know-about-industrial-strategy/>; <https://www.ft.com/content/42b63494-a042-11e6-86d5-4e36b35c3550>; <http://www.aldersgategroup.org.uk/blog/now-is-the-time-for-a-low-carbon-industrial-strategy>;

89 Energy: The Long View., Keay, M., Oxford Institute for Energy Studies, 2007

90 The shape of things to come. In, *Contours of the world economy 1–2030 AD: Essays in Macro-economic history*. Maddison, A., Oxford: Oxford University Press, 2007.

91 Greening the economy – not ‘green economy’, Simon Less, Policy Exchange, 2011

92 The Customer is Always Right, Richard Howard, Policy Exchange, 2015

93 Economic and Fiscal Outlook November 2016 - Supplementary table 2.7, OBR, 2016



damage business competitiveness, productivity and employment in the rest of the economy.<sup>94</sup>

The other issue with this sector-based approach is that it has tended to focus on a relatively narrow set of issues concerning how to expand the ‘green economy’, and largely overlooked the question of how to ‘green the economy’ more generally. In order to grow the UK economy whilst keeping emissions within agreed Carbon Budgets, it will be necessary to substantially reduce the ‘carbon intensity’ of all business activities (e.g. the carbon emissions per unit of GDP). This is referred to in the academic literature as ‘decoupling’ economic growth from carbon emissions. The UK has already decoupled emissions from growth – over the period 2000-14, UK GDP increased by 27%, whilst total greenhouse gas emissions decreased by 20%.<sup>95</sup> In order to achieve the 2050 carbon target, the rate of ‘decoupling’ will need to increase even further.

That said, one of the ways in which the UK has decoupled growth from carbon emissions is through structural change towards a more service-based economy. Over the last two decades, UK manufacturing output has been broadly flat in absolute terms, and the UK has built up a sizeable trade deficit in goods.<sup>96</sup> The UK has effectively ‘offshored’ the production of many of the goods we consume, together with the associated carbon emissions.

**The new Industrial Strategy needs to focus on how to ‘green’ the economy, not simply expand the ‘green economy’. Addressing climate change and environmental issues needs to be a mainstream objective of the Industrial Strategy, rather than an adjunct or after-thought.**

The case for putting climate change and environmental concerns at the heart of the Industrial Strategy is both environmental and economic. The UK could achieve significant economic gains by embedding sustainable thinking into its Industrial Strategy, as follows:

Firstly, there is the potential to boost productivity through improvements in energy and resource efficiency – both at an economy-wide scale and individual business scale. Research suggests that UK businesses could save £23 billion per year by improving the way they use energy and water, and reducing waste.<sup>97</sup> Separate research shows that only 38% of primary energy consumption results in useful energy output – the other 62% is wasted through losses in power stations and networks.<sup>98</sup> Government research has shown that cost-effective investments in energy efficiency could reduce energy consumption by 196TWh per year – equivalent to the output from 22 power stations.<sup>99</sup>

Improving energy and resource efficiency can boost productivity, resilience, and comparative advantage. However, many firms fail to make the most of the efficiency savings on offer. For example, the UK still consumes nearly 600 Million tonnes of resources per year, and produces around 250 Million tonnes of waste.<sup>100</sup> This is due in part to a number of economic, financial, behavioural, and cultural barriers which hold companies and households back from investing to improve their efficiency.<sup>101</sup> Government can address this through well-designed regulation and appropriate financial incentives. Far more could be done to reduce energy and resource wastage across the economy.

Secondly, there is the potential for the UK to develop and produce low carbon and environmental technologies – both for the UK market and to export overseas. Markets for low carbon and resource efficient goods and services were valued

94 Greening the economy – not ‘green economy’, Simon Less, Policy Exchange, 2011; Worth the Candle? The Economic Impact of Renewable Energy Policy in Scotland and the UK, Verso Economics, 2011

95 <https://www.carbonbrief.org/the-35-countries-cutting-the-link-between-economic-growth-and-emissions>

96 <http://webarchive.nationalarchives.gov.uk/20160105160709/>, [http://www.ons.gov.uk/ons/dcp171766\\_381512.pdf](http://www.ons.gov.uk/ons/dcp171766_381512.pdf)

97 Further benefits of business resource efficiency, Oakdene Hollins, DEFRA, 2011

98 The 2016 Energy Productivity Audit, ADE, 2016

99 The Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK, DECC, 2013

100 Digest of Waste and Resource Statistics, DEFRA, 2016

101 Efficient Energy Policy, Howard, R., Policy Exchange, 2016

at £3.4 trillion globally in 2013, and are growing year on year. Across the EU, the output from the Environmental Goods and Services sector has grown by 50% since 2000, and it now employs over 4 million people.<sup>103</sup> The low carbon economy in the UK is currently valued at £122 billion, and employs 460,000 people.<sup>104</sup> Global infrastructure investment is already shifting towards low carbon infrastructure, with renewables and energy efficiency now making up 29% of total global investment into energy infrastructure.<sup>105</sup>

In order to capitalise on these opportunities, the UK will need to build on its existing strengths, as well as spotting emerging opportunities. As discussed above, the UK's strengths lie in its strong institutions, flexible labour market, pro-market regulation, culture, and research and science base. The UK has a comparative advantage in services, in particular in finance and business services. These strengths are not only important in their own right, but also in the context of the transition to a lower carbon economy. For example, the UK is already at the forefront of clean energy project finance - one third of global clean energy projects from 2007 to 2012 had legal and financial advice from the UK.<sup>106</sup> There are a number of other clean technology clusters across the UK regions, such as nuclear in the North West, offshore wind in Humber and the East coast, and low emission vehicles in the Midlands and the North East. The UK is also at the forefront of developing low carbon products within established sectors. For example, the UK has a strong automotive sector, producing 1.5 million cars per year, around 80% of which are exported, and employing 770,000 people. The UK is already involved in the production of Ultra Low Emission Vehicles (ULEVs), such as the Nissan LEAF, and this presents a potential growth opportunity as the global market for ULEVs expands in the future.

Thirdly, and related to the above, there is potential for the UK to capitalise on its world-class science and research base to develop low carbon and environmental technologies. Although the UK research base is generally strong, the UK spends relatively little on energy R&D compared to similar countries, as discussed in our recent report, *Too Hot to Handle?*<sup>107</sup> Since 2010 the UK has spent on average around 0.24% of GDP on energy research, compared to an average of 0.44% across all OECD countries (the UK ranks 21st out of 35 OECD countries by this metric).<sup>108</sup> That said, the UK appears to perform better in terms of the number of clean energy patents registered, ranking 6th amongst OECD countries after Korea, USA, Japan, Germany and France. As part of the last Comprehensive Spending Review, the Government committed to doubling its energy innovation budget, from £250 million to £500 million, and has recently announced the creation of an Energy Innovation Board.<sup>109</sup>

**Over the next year, Policy Exchange will be exploring what policy-makers can do to embed climate and environmental thinking within the new Industrial Strategy, as follows:**

- **How can the UK minimise the cost of the transition to a lower carbon economy?** What potential is there to improve energy and resource efficiency, and how can this be unlocked? How can energy and climate policy be improved to deliver decarbonisation at least cost? What are the skills implications of the transition to a lower carbon economy?
- **How can the UK maximise the economic opportunities associated with the**

102 The global green race: a business review of UK competitiveness in low carbon markets, William Tipper, Green Alliance, 2013

103 Eurostat

104 The size and performance of the UK low carbon economy, BIS, 2015

105 World Energy Investment, IEA, 2016

106 Will the UK economy succeed in a low carbon world?, Francis et al, 2016

107 Too Hot to Handle?, Richard Howard and Zoe Bengherbi, Policy Exchange, 2016

108 International Energy Agency, RD&D online data service

109 <https://www.gov.uk/government/speeches/greg-clark-speech-at-energy-uk>

**transition to a lower carbon economy?** What are the UK's existing strengths, and how could they be harnessed? Where do we have genuine comparative advantage?

- **How can Government support the low carbon industries of the future, whilst avoiding 'picking winners' and subsidising particular technologies?** How can we bridge the valley of death between research and commercialisation? To what extent is this about boosting research funding, or de-regulation to encourage innovation?
- **How can infrastructure investment deliver both productivity improvements and decarbonisation?** How can the UK avoid becoming locked in to carbon-intensive infrastructure? What are the fiscal implications of the transition to a lower carbon economy?
- **How will the transition to a lower carbon economy be managed?** What is the balance between national and local policy?

Under Theresa May's leadership, the Government has signalled an intention to develop a new Industrial Strategy – but there has been much less clarity about what this should mean in practice.

Today, too many people worry that globalisation and the modern world do not work for them. Britain's 'Just About Managing' majority is pessimistic about our economic future, believing the best now lies behind us. The overriding goal of a new Industrial Strategy should be to create an economy in which everyone can look forward to the future.

Globalisation has been good for the world and for Britain. It is understandable, however, why many people have become increasingly pessimistic:

- Productivity and real household incomes have been stagnant for over a decade.
- Many parts of Britain have not shared in the same success seen in London and the South East.
- While innovation is alive or accelerating in the digital world, in the physical world there are fears it may be stagnating.
- The cost of living and household bills continue to increase, but voters aren't confident that this is really delivering environmental sustainability.

Over the next year, Policy Exchange will be undertaking an extensive programme of work to better understand how to create a modern industrial strategy.

In this scoping paper, we look at the big questions surrounding a new Industrial Strategy:

- What is an Industrial Strategy? What lessons can we draw from past successes and failures? What types of policies work, and what don't?
- What are the UK's economic strengths and weaknesses? What future trends will create new opportunities or threats?
- What are the deeper causes behind Britain's economic challenges? Why does British productivity lag so much behind its peers, or the distribution of its cities seem so unbalanced?
- What shape should a new Industrial Strategy take? Could we turn Britain into the most innovative economy in the world? How do we ensure any new Industrial Strategy is green?

If so, may drop the "Globalisation has been..." section, and go straight to "Over the next year"