Institute for Public Policy Research

IPPR

THE SCIENCE-BASED ECONOMY

THE ROLE OF HEALTH RESEARCH

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FOREWORD

The ‘science-based economy’ was one of the most exciting ideas in the 2019 Conservative Party manifesto. As the UK economy faces a perfect storm of high debt from the crash of 2008 and Covid-19, historically low productivity from an over reliance on booms in consumer spending and house price inflation and now the imminent prospect of a post-Covid bankruptcy and redundancy surge from the collapse in the ‘old’ high street retail sector, we badly need new high growth sectors.

Fortunately, we are a global science superpower. We have the potential to be the laboratory and test bed of the technology and innovation set to transform the global economy. From Hydrogen fuel to AI, new cancer immunotherapies to stem cells, grapheme to 3D printing, synthetic biology to disease resistant crops, satellites to electric planes, the UK is a technology powerhouse.

What we have been less good at, traditionally, is converting our leadership in science and technology into successful commercialisation. The Crash, Brexit and now Covid-19 are major challenges which justify – nay, cry out for – bold investment in industrial and scientific leadership.

To achieve the transition from a fragile, low productivity, cheap labour service economy to a high productivity ‘innovation nation’, which creates opportunities for new jobs in smart high growth sectors, we need a few ingredients.

First, serious investment in core science – both blue-sky, long-term research and net market research. Crucially, that means a mixture of both core funding for our world-class centres like the Camrbidge MRC Laboratory of Molecular Biology (which alone has won more Nobel prizes than France),, but also a more innovative model of co-investing on the model of the successful Biomedical Catalyst Fund I launched with David Cameron in 2012. And some bold ‘challenge’ programmes like the Longitude Prize, which attracted major global interest.

Second, we need to create a serious funding ecosystem, which incentivises the risk takers to take early stage companies to global scale. Scale up, not start up, is our core problem. So let’s create new channels to plug the City into our science base better, so we don’t just launch great businesses here, but also grow them.

And third, let’s use our public sector procurement – at home, in our creaking public services, and abroad via our aid and trade leverage – to create a home market and make the UK a jumping off point for accessing the fastest growing global markets.

A real commitment to making the UK a science superpower and an innovation nation isn’t just essential for our economic competitiveness. It’s a win-win-win. Making our public services a test bed for innovation would help accelerate public sector modernisation. And it would help drive a more balanced and sustainable economy. Innovation is the key to achieving productivity gains across the whole of our country: driving up and spreading opportunity to areas currently languishing in London’s shadow.

Nowhere is the opportunity bigger than in the bio-economy: the appliance of bioscience to help solve the most urgent global Grand Challenges, such as feeding, fielding and healing a rapidly developing world population. The BioEconomy should sit right at the heart of the science-based economy. The UK has world-class academic institutions; the best scientists; and some of the most innovative companies. It is already a strength – but we have neglected to move it from a narrow focus on lab science to a more mainstream mission to put it at the heart of our economic model.

A focus on the broader life sciences can support progress on the national economy, but also against other key pledges in the Conservative manifesto. First, it can be the backbone to the levelling-up agenda. As the prime minister has said, talent is equally distributed across the country, but opportunity is not. Promoting life sciences can help harness that talent for the common good.

Second, it can support ambitious proposals on health. We have pledged to increase healthy life expectancy by five years, by 2035; to narrow health inequalities; and to support the workforce through exciting new technology. This relies on innovation – and a strong like between the science, the economy and our health.

Naturally, achieving such ambitions will require investment. If we expect private investment to follow to the UK, we must show a willingness to invest in science and innovation ourselves. And we must make sure we have the globally competitive clusters across the country – by providing the infrastructure, connectivity and skills the sector needs.

But it will also rely on partnership and collective spirit. The UK must become the best place to do research, development and manufacture in the world, and the UK government the most trusted research partner. This report provides evidence and recommendations that can help make that happen, and I hope that they are seriously considered by ministers.

George Freeman MP

Member of Parliament for Mid-Norfolk

Minister for the Future of Transport, 2019–20
Chair of Prime Minister’s Policy Board, 2016–17
Minister for LifeScience, DigitalHealth, Agritech, 2014–16
UK Trade Envoy, 2013–14
PPS, Dept Energy & Climate Change, 2011–13

SUMMARY

£222bn

UK underinvestment in R&D since 1985

Science should have a central role in the UK economy, which has struggled with productivity since the 2008 financial crash. This is a problem. Poor productivity stifles growth and makes it harder to deliver improved living standards. Increasing investment in research and development (R&D) is an evidenced way to improve productivity – but is an area the UK has significantly underinvested in since the 1980s. We estimate UK underinvestment in R&D totals £222 billion since 1985, when compared to OECD averages. Rectifying this should be a clear priority.

It is important we prioritise health research and development, including basic science, public health, behavioural science, and innovation development. The UK's health sector has clear strengths. It has an enviable academic base, delivers strong return on investment, and is home to an exciting range of businesses with the potential to grow. As we build the role of science in our economy, health research and the life sciences should be a central pillar in our approach.

But we need a strategy to maximise gains. Health research and the life sciences can provide significant value – for our economy, society, and health. However, we will not maximise that value without a coherent strategy. The new 'R&D Roadmap' has begun that process for the research and development as a whole. However, we need to translate that into specific, bold strategies for strength R&D areas – like health and the life sciences. This report outlines a progressive approach, based on three central pillars.

£8bn **non-industry investment needed in life sciences, per year, by 2027**

1 PILLAR ONE: MAXIMISE INVESTMENT

Government should invest in health research, and consciously work to attract private investment. The government has set encouraging targets for R&D investment. It must now deliver. Our modelling indicates government and charity ('non-industry') should invest £8 billion per year in the life sciences by 2027 – double the current level of spend. They should also look to actively attract private investment, by putting in place the infrastructure to make the UK the best and most reputable place in the world to do life science R&D.

Policy recommendation: Government should commit to investing £8 billion per year of non-industry spend in life science R&D by 2027. It should also ensure it has a strategy to attract private investment into UK life science R&D. This means building the social and physical infrastructure needed to make the UK life sciences globally competitive.

2 PILLAR TWO: LEVEL UP

Government should level-up UK life science across the whole country, not just the South East. Traditionally, both private and public investment has gone to England's 'golden triangle': Oxford, Cambridge and London. However, there are many life science clusters in the rest of the UK with significant growth potential, but which receive little support. As we increase science investment, we should aim to ensure these places also have the opportunity to grow, compete and thrive on a global stage. This would create a stronger, more inclusive economy.

Policy recommendation: Government should take a 'strengths-based approach' to UK life science. This should have an overt focus on delivering growth in areas that have potential, but currently receive little support. This partly means more equal distribution of R&D funding across the UK. But it also means rectifying inequalities in the physical and social infrastructure that different parts of the country have access to - for example, skills, transport, broadband or capital.

3 PILLAR THREE: DELIVER VALUE

In return for investment, government should expect progress on its social and clinical priorities. It is right that government invest in innovation, and demonstrate that they value it properly. This is important in encouraging private investment; to building a healthy innovation eco-system; and ultimately to improving outcomes for patients. However, in exchange, government should also expect to see progress on its social and health priorities. Where that does not happen naturally, it should actively intervene.

Policy recommendation: Government should demonstrate it values innovation. This means implementing innovation in the health system. But it also means investing in high-risk, high-reward, early-stage R&D – to reduce access barriers for businesses to enter the market. In exchange, government should expect progress on its social and clinical priorities. Two mechanisms would help tie public investment to such progress. Firstly, government should create a new £1.3 billion investment fund, governed by a board of charities, patient representatives, and researchers. This body should drive research forward on 'under-served' conditions, where R&D investment is traditionally low. Secondly, government should scale up its use of mission-based research – to address new, long-term health challenges.

Covid-19 has only accentuated the case for strong UK life sciences research. The risk of 'health shocks', like Covid-19, is only increasing. Strong health R&D supports resilience against such events. Given the impact Covid-19 has already had, government should look to build such resilience proactively, rather than waiting for any new crises to strike.

CONTENTS

1. SCIENCE: WHAT IS IT GOOD FOR?

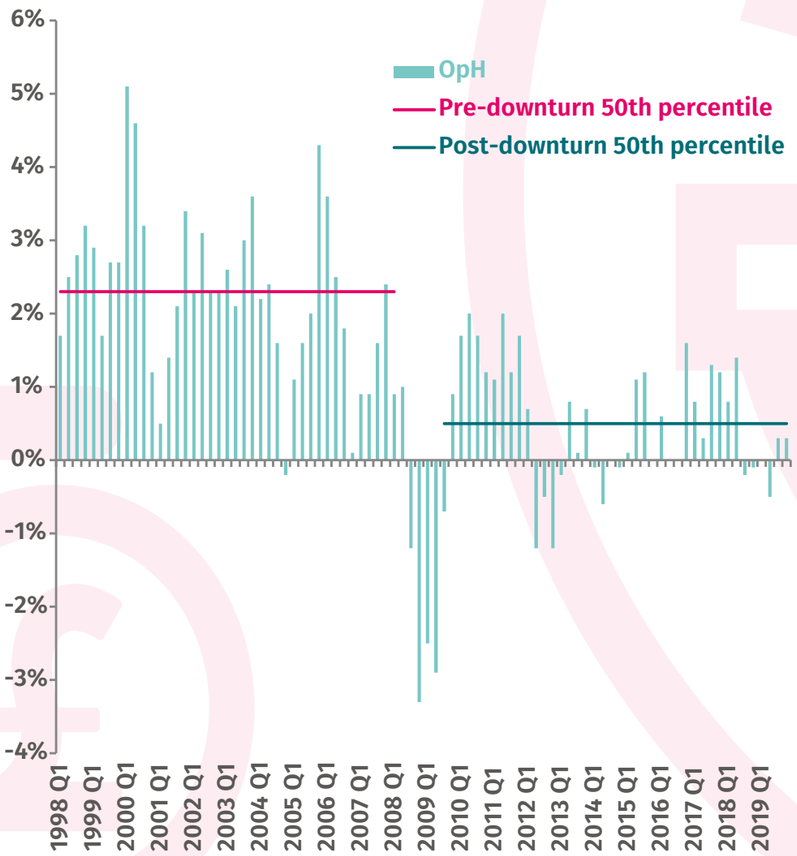
THE PRODUCTIVITY PUZZLE

The UK has experienced a productivity crisis over the last decade. Many expected a short drop in productivity following the 2008 global financial crisis. In reality, we've seen 'productivity hysteresis': a permanent loss of productivity from a temporary shock (Adler et al 2017).

This is not just an abstract economic challenge. Productivity is a key driver of long-term growth. It helps to generate government revenue, increase the value of labour, and sustain average wage growth (Krugman 1997).[1] Such metrics are always important – but could be even more so, if Covid-19 has the severe economic impact many are predicting.

FIGURE 1.1: UK PRODUCTIVITY HAS BEEN STAGNANT SINCE THE 2008 FINANCIAL CRISIS

Output per hour (OpH) quarter-on-year log growth percentiles (percentage)

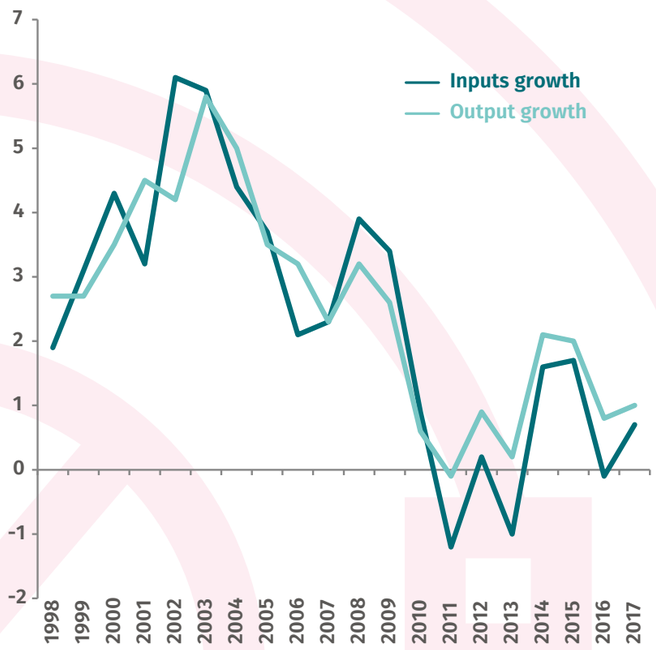


Source: Recreated from ONS 2020a

1 However, the distribution of these gains relies on other government actions and a fair economy.

FIGURE 1.2: UK PUBLIC SECTOR PRODUCTIVITY HAS ALSO STAGNATED

Inputs and output growth year on year, before and after 2009, public services



Source: Author's analysis of ONS 2020b

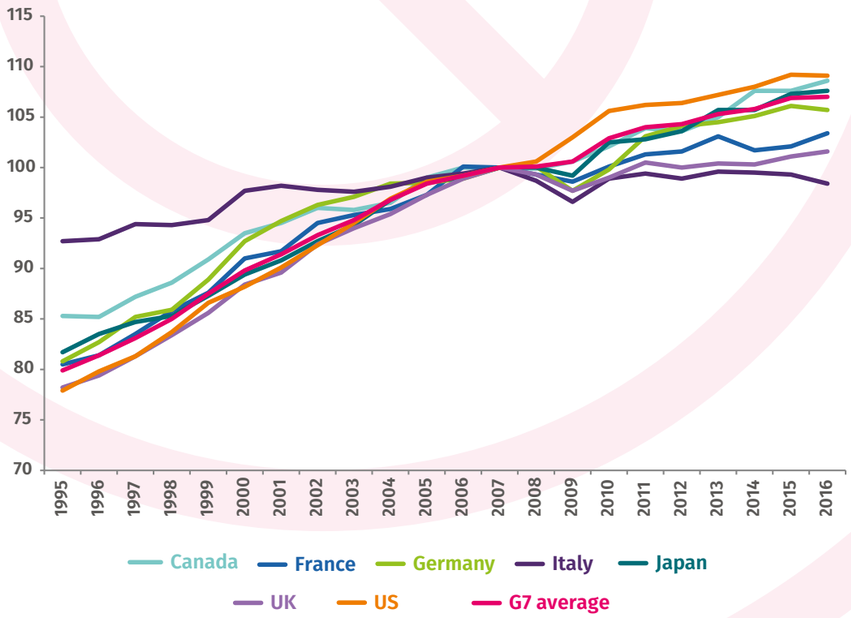


FIGURE 1.3: UK PRODUCTIVITY HAS BEEN WEAK COMPARED TO G7 NATIONS

GDP contribution per hour worked (rate), G7 Nations, 2007=100

Source: Recreated from ONS 2017

THE ROLE OF R&D INVESTMENT

There is no silver bullet to restore productivity. As IPPR has argued elsewhere, that would take nothing short of a systematic reorganisation of the economy (Roberts et al 2019). Nonetheless, innovation – the production, adoption, assimilation or exploitation of new, value adding products (Edison et al 2013) – will be critical. It is the clearest route to improving what can be produced for a set amount of capital and time. As Richard Jones has put it, productivity is "a problem of a decline in innovation, in its broadest sense" (Jones 2019).

More innovation means more research and development (R&D) (Parkes 2019; Jacobs et al 2017). R&D is known to drive productivity – Goodridge et al, among others, have shown a direct link (Goodridge et al 2016). However, the UK invests relatively little compared to other advanced countries (see figures 1.4 and 1.5). Such low investment has been shown to have a negative impact on our economy and our productivity (Jones 2016).

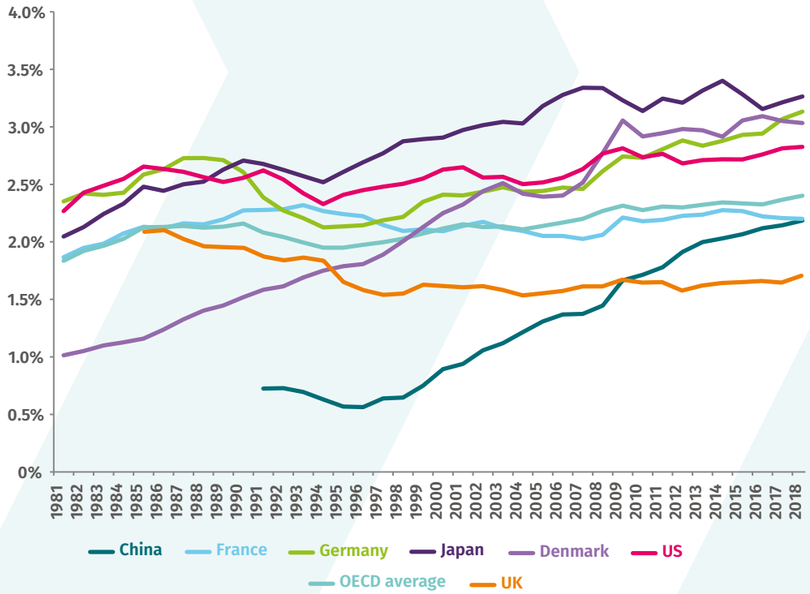


FIGURE 1.4: UK RESEARCH INVESTMENT HAS STAGNATED OVER THE LAST 30 YEARS

Gross domestic spending on R&D (percentage of GDP), 1981–2018

Source: Authors' analysis of OECD 2020

DEFINING R&D

Government tax guidelines say an activity can be counted as R&D if it:

- advances science or technology
- overcomes uncertainty in a way that could not be easily worked out by a professional in that field (HM Treasury 2007).

Elsewhere, R&D has been defined more broadly as: "activities undertaken by firms and other entities... in order to create new or improved products and processes" before manufacture, commercial sale or use (Hall 2006).

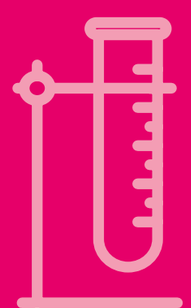
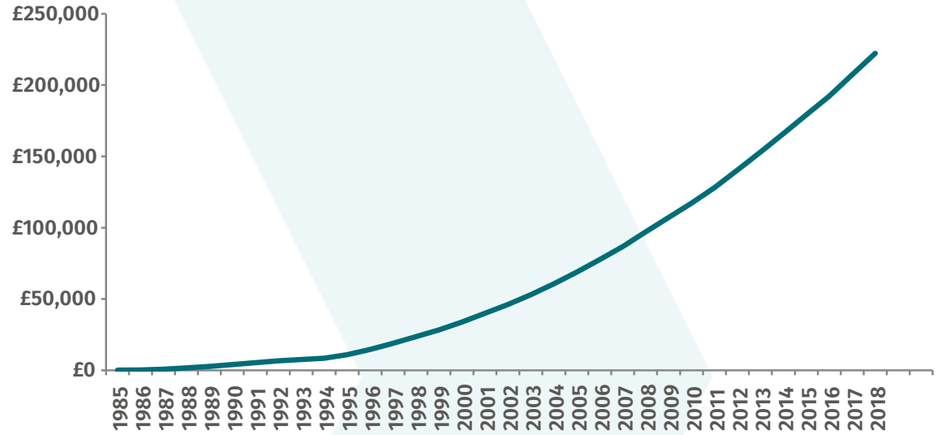


FIGURE 1.5: UK UNDERINVESTMENT IN R&D TOTALS £222 BILLION SINCE 1985

Cumulative underinvestment compared to OECD average (as a percentage of GDP), £millions



Source: Author's Analysis of OECD 2020

R&D TARGETS

The UK government's R&D target is based on the UK's gross domestic product. Specifically, they have committed to invest in R&D equal to 2.4 per cent of the country's GDP per year. We should be cautious about GDP targets, particularly during times of economic instability. If Covid-19 causes GDP to decline, and the UK to enter a recession, government would then need to invest less money to meet their R&D target. Yet, it is during a downturn that R&D investment, productivity gains and growth are most important. To avoid this counter-intuitive scenario, government should also commit to fixed R&D targets covering at least the next seven years (in pounds and pence). We outline what these should be in section 2.

CASE STUDY: R&D IN GERMANY

Germany presents one of the world's R&D success stories, having achieved a long-standing aim of investing the equivalent of 3 per cent of their GDP in R&D in 2017 (figure 1.4). There were many key factors in this achievement, including:

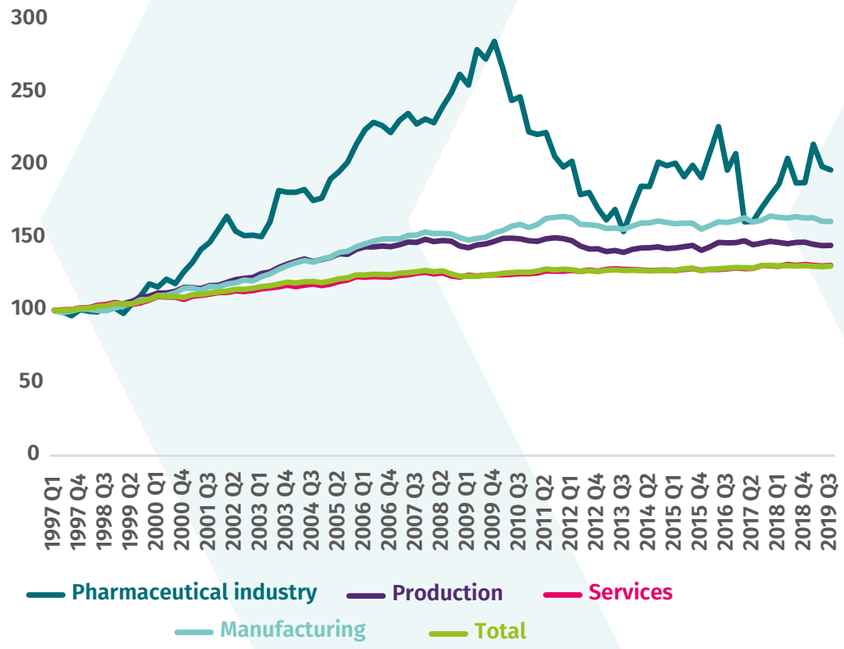
- significantly increased R&D expenditure, by 37.9 per cent between 2007 and 2017
- focus on a strength industry – the automobile industry – where idea density has been particularly high (Whiting 2018)
- clusters of excellence across the country, across regions, spearheaded by 'universities of excellence'
- active management of the movement of ideas to marketplace through Fraunhofer Institutes (Breznitz 2014)
- development of both social and physical infrastructure (eg skills and manufacturing capacity).

HEALTH RESEARCH IS THE UK'S NATURAL R&D PILLAR

The UK should focus new R&D investment on sectors with the strongest value proposition. The life sciences – a research field covering the application of biology and technology to health improvement (UK Parliament 2018) – has a strong case for prioritisation.

FIGURE 1.6: LIFE SCIENCE OUTPERFORMS THE UK ECONOMY ON PRODUCTIVITY

Productivity in pharmaceuticals and other economic sectors, UK, 1997–2019. Index: 1997 Q1=100



Source: ONS 2020c and 2020f

Return on investment

Historically, the life science sector has been highly productive (see figure 1.6).

Moreover, it provides significant return on investment. £1 of public money invested in life science R&D generates a return equivalent to between £0.22 and £0.28 every year in perpetuity (King's Policy Institute 2017).

Productivity in the NHS and care

- The health sector represents around 10 per cent of our economy – and this share is growing (Jones 2019). However, its productivity gains have relied on doing 'more with less' – and are unlikely to be sustainable much longer (Maguire 2019).
- Science is driving exciting innovation – in personalised medicine and care, genomics, artificial intelligence (AI), big data, machine learning, and robotic surgery. This could provide more sustainable productivity gains.

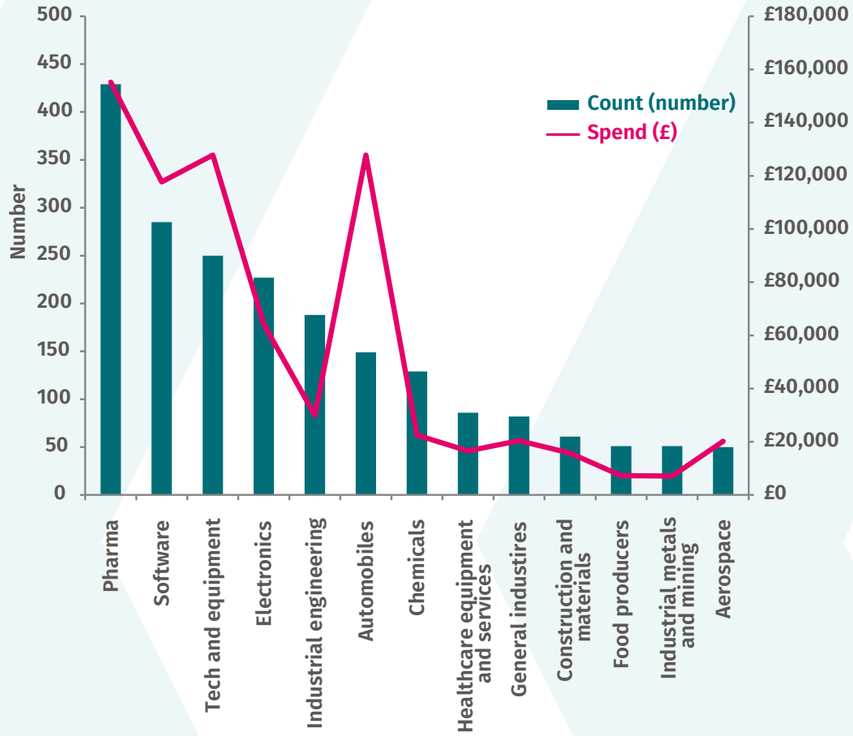


FIGURE 1.7: NO SECTOR INVESTS MORE IN GLOBAL R&D

Number of firms and total research spend by sector, global

Source: European Commission 2019

Significant private investment opportunity

No other industry commits more private money to R&D than the life sciences. In 2019, pharmaceuticals companies invested over £155 billion into global R&D (see figure 1.7). Despite this, the UK's relative share of global life science investment is in decline (Thomas 2019).

Wider benefit

- Life science also benefits sectors outside the healthcare sector. Improved health supports a larger labour force, reduces days lost to illness, and improves labour productivity.
- Previous IPPR research estimated that innovation in cancer could generate £10 billion of economic value, through avoided mortality and morbidity (Thomas et al forthcoming).

Existing strengths

- R&D works best in places with strong, cross-sector partnerships.
- Health research in the UK benefits from strong collaboration between academic, public, charity, patient and business groups – often providing expertise and investment in different parts of the research pathway.
- Further investment should look to cement and build on this strength.

SECTION 1
POLICY IMPLICATIONS

- **The government should continue to prioritise R&D investment in the post-Covid-19 economy.** They should at least maintain current levels of ambition. They should also translate their investment ambition from 'percentage of GDP' to 'annual £ invested'. This will ensure that productive growth and investment remains a long-term priority in the post-Covid-19 economy.
- **The government should continue to prioritise life sciences in this target.** The sector has the infrastructure and growth potential to be the central pillar of the country's science-based economy. As sections 3 and 4 of this report will outline, they should ensure it is prioritised in a way that matches public funding with inclusive growth and societal value.

2.
PILLAR 1: MAXIMISE INVESTMENT

INVESTING TO REACH 2.4 PER CENT OF GDP BY 2027

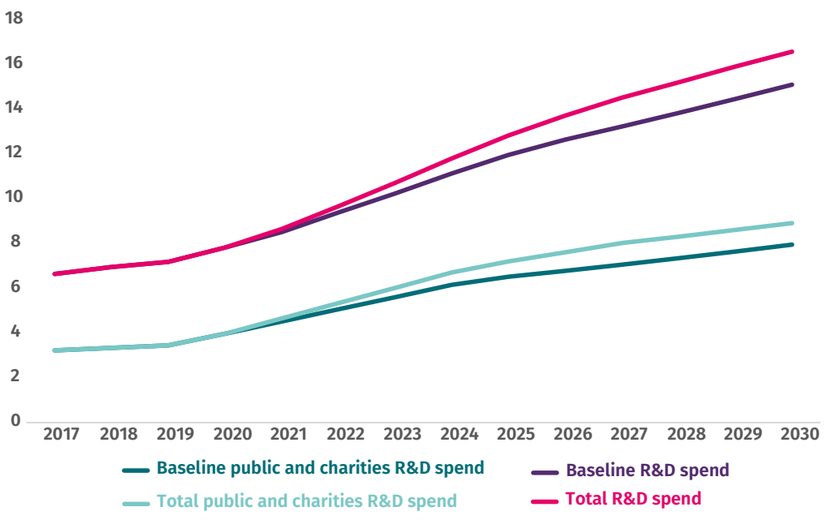
The UK has committed to a target of 2.4 per cent of GDP invested in R&D by 2027 (and more thereafter). Meeting this target will rely on increased public and private investment in R&D. Below, we analyse what government meeting its target would look like from a life science perspective. We use the estimates of GDP growth used for the 2020 budget as **we do not believe R&D investment should now drop if the economy weakens** (see section 1).

Our model shows that, on current trajectory, the life sciences would remain £1.3 billion short of the investment needed to meet the 2027 investment target. Notably, this is roughly equal to the estimated amount of research funding per year received from EU programmes (Royal Society 2017).

Furthermore, government may need to reckon with the financial impact of Covid-19 on the charitable sector. Charity provides significant R&D investment, and also crowds-in private sector investment. However, the financial impact of Covid-19 may constrain their expenditure in the coming years. For example, three-quarters of medical research charities anticipate a fall in fundraising income of 25 per cent or more (AMRC 2020). This would further impact progress towards the government's targets – putting greater onus on public funds.

FIGURE 2.1: GOVERNMENT PLEDGES STILL FALL SHORT OF THEIR R&D INVESTMENT GOALS

Comparison of projected spend on life science R&D with spend necessary to meet 2.4 per cent target (2017–30)



Source: Author's analysis of ONS 2019, OLS 2019, ONS 2020d, OBR 2020, and Sussex et al 2016
Note: The space between the lines represent predicted shortfall in public and total R&D spend, in terms of the government's 2.4 per cent of GDP investment target.

PRIVATE INVESTMENT AND A UK SCIENCE ECOSYSTEM

Attracting private investment is crucial to meeting our R&D ambitions. This means the UK must have a strategy for influencing investment decisions, more often than not made in global boardrooms. This would not only help increase investment in UK science, but would also strengthen our eco-system, by bringing in a more diverse array of partners.

The UK struggled to attract private investment into the life sciences in the 2010s. Government strategy was focussed disproportionately on a single factor – fiscal policy. They introduced policies like the patent box scheme and R&D tax credits, but these alone did not lead to improved UK performance, relative to the global competition (figure 2.4). While our relative share has dropped since 2010, the USA increased their share of the global market – from 55 to almost 60 per cent (Thomas 2019).

TABLE 2.1:[2] DESPITE RECENT COMMITMENTS, WE PREDICT NON-INDUSTRY INVESTMENT WILL FALL SHORT BY 2027 ON ITS CURRENT TRAJECTORY

Projected public and charity life science R&D expenditure, 2021–27 (£bn)

Non-industry spend	2020	2021	2022	2023	2024	2025	2026	2027
Current trajectory (baseline)	4.0	4.5	5.1	5.6	6.2	6.5	6.8	7.1
To meet 2.4% target	4.0	4.7	5.3	6.0	6.7	7.2	7.6	8.0
Additional required	+0.0	+0.1	+0.3	+0.4	+0.6	+0.7	+0.8	+1.0

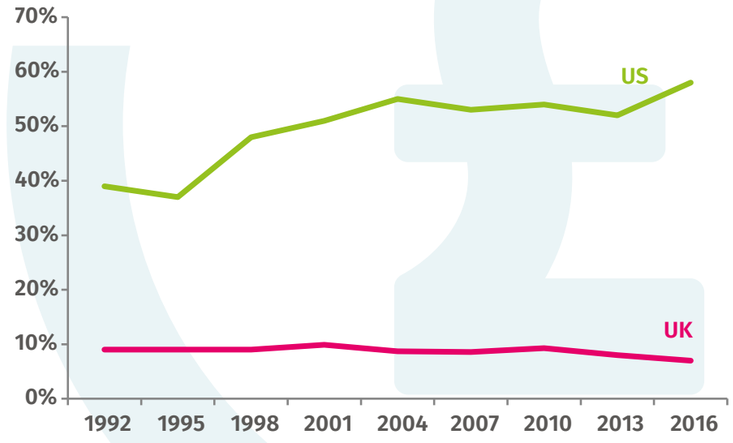
TABLE 2.2: THIS WILL HAVE A KNOCK-ON EFFECT ON PRIVATE INVESTMENT, LEAVING THE UK FURTHER SHORT OF ITS STATED R&D AMBITIONS

Projected private life science R&D expenditure, 2021–27 (£bn)

Industry spend	2020	2021	2022	2023	2024	2025	2026	2027
Current trajectory (baseline)	3.9	4.0	4.3	4.6	5.0	5.5	5.9	6.2
To meet 2.4% target	3.9	4.0	4.3	4.7	5.1	5.6	6.1	6.5
Additional required	+0.0	+0.0	+0.0	+0.1	+0.1	+0.2	+0.3	+0.3

FIGURE 2.2: THE LAST DECADE OF POLICY HAS NOT MADE THE UK MORE COMPETITIVE ON THE GLOBAL STAGE

Percentage of global R&D invested in the UK by year, 1991–2016



Source: Recreated from Thomas 2019

If our poor performance continues into the next decade, the result could be even more severe. While not included in the above dataset, both China and Singapore have put significant investment into R&D in recent years (Eurostat 2017). Competition for private investment is growing. This makes it ever more important that the UK acts decisively.

Acting decisively means taking a much more holistic approach in the 2020s (Jones and Wilsdon 2019). That is, they should look to how social, infrastructure and fiscal policies can support the role of life science in the economy. This was the thrust of John Bell's Life Science Industrial Strategy. Below, we outline the key themes government should consider (and make specific recommendations in the following section).

2 In our baseline, we assume that industry and non-industry investment will grow in line with March 2020 GDP forecasts. Additionally, we include the 2020 budget commitment to spend £22 billion on all R&D by 2024/5. We further assume that public investment crowds-in private investment at the rate estimated in Sussex (2016). Finally, we do not include the exceptional funding allocated by government to the Covid-19 efforts, as that would likely include double counting alongside the £22 billion. Charity and public funding are combined for two reasons. Firstly, they both have an established crowding in effect. Secondly, it is assumed government will need to address any lost income from the sector, which has been hit by Covid-19, to achieve its overarching targets.

TABLE 2.3: CROWDING-IN INVESTMENT

Theme	Context	Priority for new interventions
Securing investment		
Skills and workforce	A skilled workforce is critical to life science investment decisions. That means the best scientists, but also manufacturing specialists, technicians and other skilled workers.	**High:** Previous governments have not linked our skills base and our life science strategy in a clear or ambitious enough way. Following Brexit, a strong approach to domestic skills will be critical.
Fiscal environment	The fiscal environment can attract private investment – but must be balanced against lower public returns from business activity	**Low:** The coalition government focussed on this explicitly. However, a more holistic strategy should now be the priority.
Connectivity and clustering	Private investment is stronger where clusters are more developed. This is because knowledge is generated, transmitted and shared more efficiently in proximity. A well-connected cluster will have more innovations (DeVol et al 2004).	**High:** The UK has many competitive health and life science clusters – often emerging without government support. The priority is matching their potential with government investment – most obviously outside of the 'golden triangle'.
Life science industry base	Core life science infrastructure includes academic, manufacturing and translational infrastructure. The stronger each is, the more attractive investment will be.	**Medium:** The UK's science base is world leading, particularly for a country of our size. However, it must not rest on its history, and could significantly improve its translational infrastructure.
Policy stability	Excellent policies encourage private investment. But that is moderated by the trust, in global boardrooms, that government will deliver on pledges.	**Medium:** Government can improve its credibility. Brexit has impacted our stability and reputation, underlining the importance of supportive schemes such as the life science industrial strategy, the Accelerated Access Collaborative, and the voluntary scheme for branded medicines pricing.

Source: Authors' analysis

TABLE 2.4: TRANSLATING INVESTMENT INTO VALUE

Theme	Context	Priority for new interventions
Creating value		
Capital investment	Moving from research to development (trials, manufacture, prototypes, testing) requires significant capital. Yet, UK SMEs struggle to access large amounts of patient capital, preventing them from scaling.	**High:** If the UK is to maximise value from life science and health research, it needs to support its business base and ensure the most innovative companies thrive.
Adoption and spread	Critical for two reasons. Firstly, innovators want to see their products in practice – and slow adoption will be a disincentive. Secondly, it is impossible to run clinical trials – and prove an innovation is truly innovative - if the system is not consistently using the best available products.	**High:** The UK has moved to address this challenge – through the Accelerated Access Collaborative and the Health Data Research UK hubs, designed to maximise use of a variety of innovations across the health system. However, there remains significant scope for progress.
Manufacturing capacity	The ability to produce products in the UK creates a link between science and exports – and means more UK discoveries will become UK exports. It is also an important way to support UK SMEs.	**High:** Once private investment manufacturing comes to a country, it tends to stay. Attracting and anchoring more capacity would be an excellent way to boost prosperity.
Regulation and market access	21st century science is very different to 20th century science. It is often more personalised. Yet, market access is often difficult, and based on models designed decades ago. This defines the UK's reputation to international executives.	**Medium:** NICE is engaged in a methods review. The priority must be ensuring that this comes up with a flexible approach, that can get the genuinely best and most transformative innovations to patients, as quickly as possible.
Clinical trials	Critical to ensuring R&D can be commercialised in the UK. The UK has a post-Brexit opportunity to reduce the costs associated with trials, namely through data.	**Medium:** The UK should explore how it can become a global leader in trials post-Brexit – by creating cheaper, more flexible, data-led trials.

Source: Authors' analysis

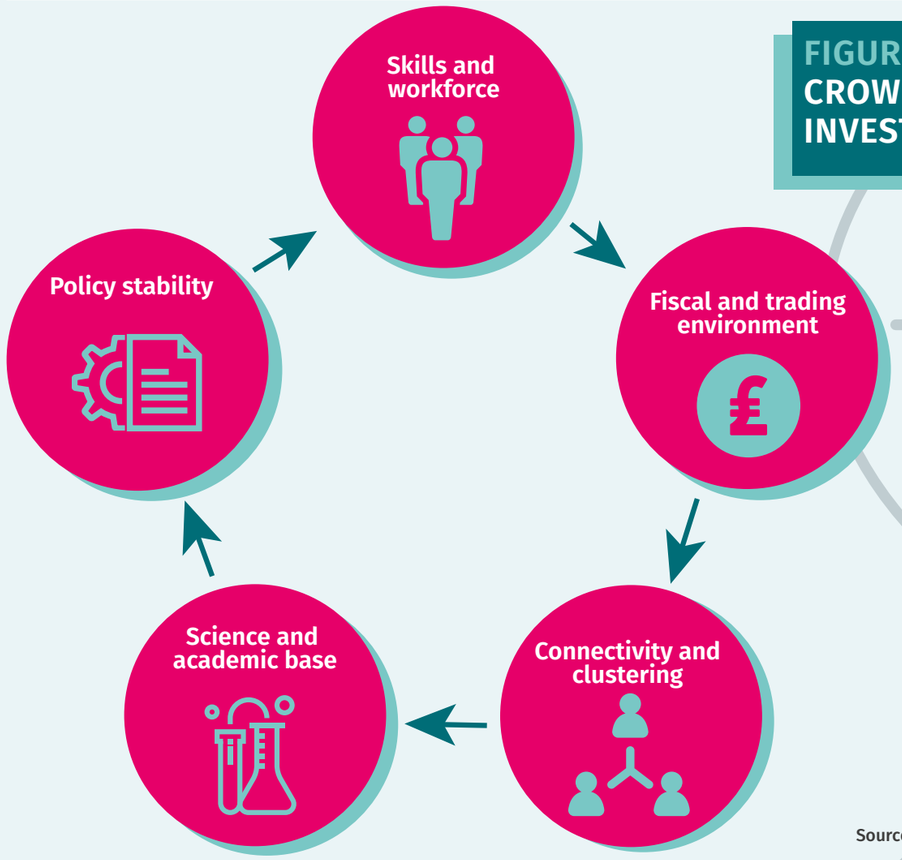
CASE STUDY: **FRAUNHOFER INSTITUTES**

The UK has world-leading life science businesses, charities and academic infrastructure. However, we lack infrastructure focussed on the translation of life science research and innovation into practice.

This could be filled by 'Public Research Institutes' – a type of public research body that helps innovation 'cross the valley of death" between research, development and commercialisation. The most famous model is the Fraunhofer institute in Germany. The institute has an explicit focus on practical, human problems – for example, around health, security, and the environment.

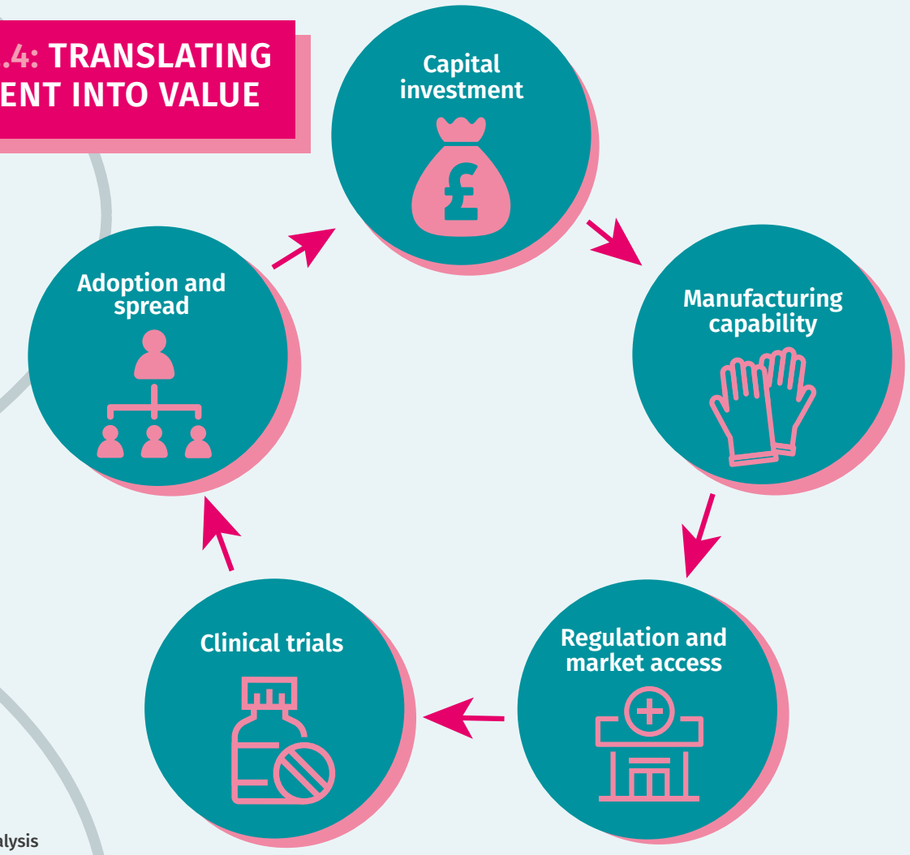
Fraunhofer has 66 local institutes conducting research, providing a conduit between industry and academia. Its focus is on developing products and processes. Individual solutions are created in close collaborations with industrial partners – with collaboration on ensuring market access and spread common (Rombach 2000). It has a 2018 budget of €2.8 billion (approximately £2.5 billion).

FIGURE 2.3: CROWDING-IN INVESTMENT



Source: Authors' analysis

FIGURE 2.4: TRANSLATING INVESTMENT INTO VALUE



Source: Authors' analysis

VALUING INNOVATION

An important factor in the decisions taken by international life science companies is how much value they perceive a government to place on innovation. While it remains important for government to ensure the price it pays does represent value, it equally needs to ensure that patients have access to the right treatments.

This is important for:

- the perception of policy stability and credibility in the UK
- the ability of clinical trials to take place in the UK, as new treatments need to be proven to beat the best competitor
- the full benefit of R&D and innovation is only achieved if products make it to patients.

The government could demonstrate it values health innovation by ensuring good innovations reach patients at a fair price. It could also 'de-risk' R&D, by investing in high-risk, high-reward science. In return, government should expect to see progress on its economic, clinical and societal priorities – mechanisms to tie those to investment can be found in section 4.

SECTION 2
POLICY IMPLICATIONS

- **The government should commit to £8 billion of non-industry investment in the life sciences by 2027.** They should also commit to increasing investment in both UK science and life science thereafter.
- **Government should set out a clear strategy to attract £6.5 billion of private investment per year by 2027.** This strategy must be broader than those seen in the previous decade. It should cover skills, patient capital, physical infrastructure and connectivity. We discuss this further in section 3.
- **Government should monitor developments in the research charity sector.** Many charities have suffered financially during the Covid-19 crisis. Losing our strong medical charity sector would be highly detrimental. Government should consider directly funding any shortfall.
- **The British 'DARPA'[3] – a planned new government research institute – should be modelled on the Fraunhofer model.** This would see it tasked with setting up regional centres that focus on high impact and practical research. As well as undertaking high risk, high reward research on areas that are highly practical, it should have responsibility and capacity to manage the translation of transformative ideas into practice.

3 Defence Advanced Research Projects Agency

3. PILLAR 2: LEVEL UP

Too often, prosperity and equality are seen as a dichotomy. This chapter argues that is not the case.

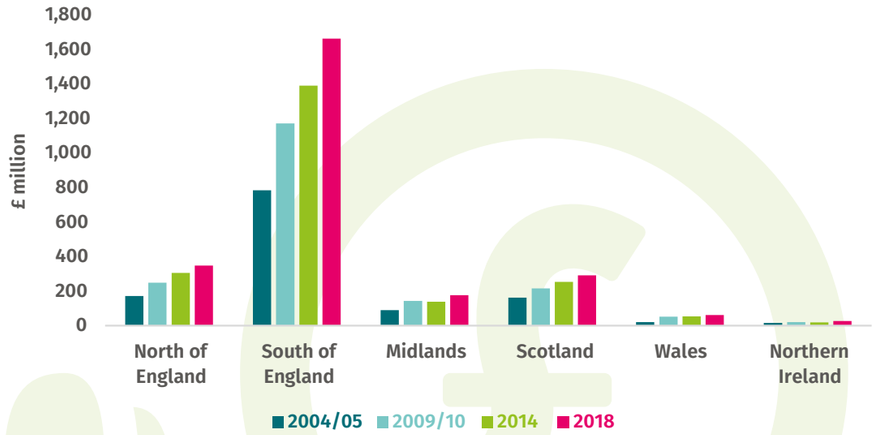
Instead, it puts forward the case for a 'strength-based approach' to health research. This would link our ambitions to uplift investment to inclusive growth. More practically, it would see government look for high-potential niches, preferably outside of the South East, and then provide them the support they need for fast-growth. As argued in section 2, that support should take the form of funding for research, but also the investment in social and physical infrastructure needed to support a leading life science sector.

INEQUALITY OF OPPORTUNITY

Health research investment is not equally distributed

FIGURE 3.1: PUBLIC AND CHARITY INVESTMENT IS GEOGRAPHICALLY SKEWED

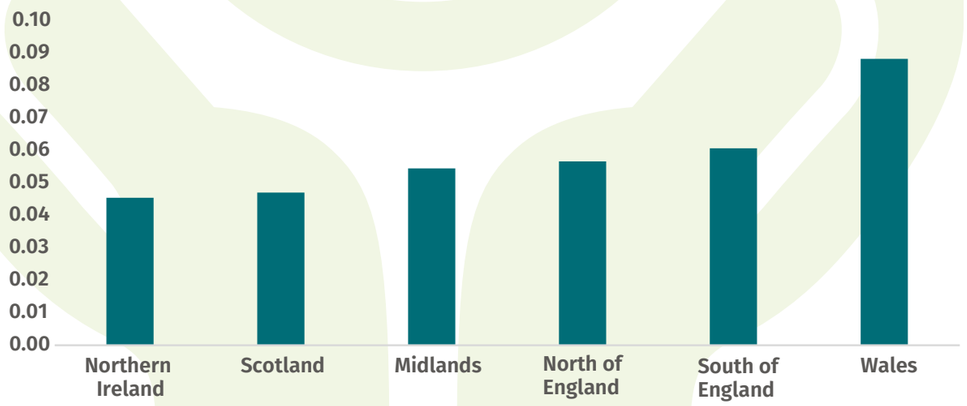
Public and charity health research spend by region, 2004/05–2018, £ million



Source: Authors' analysis of UKCRC 2020, figures in real terms (2018 prices)

FIGURE 3.2: THIS HAS NOT CHANGED RAPIDLY ENOUGH IN THE LAST 15 YEARS

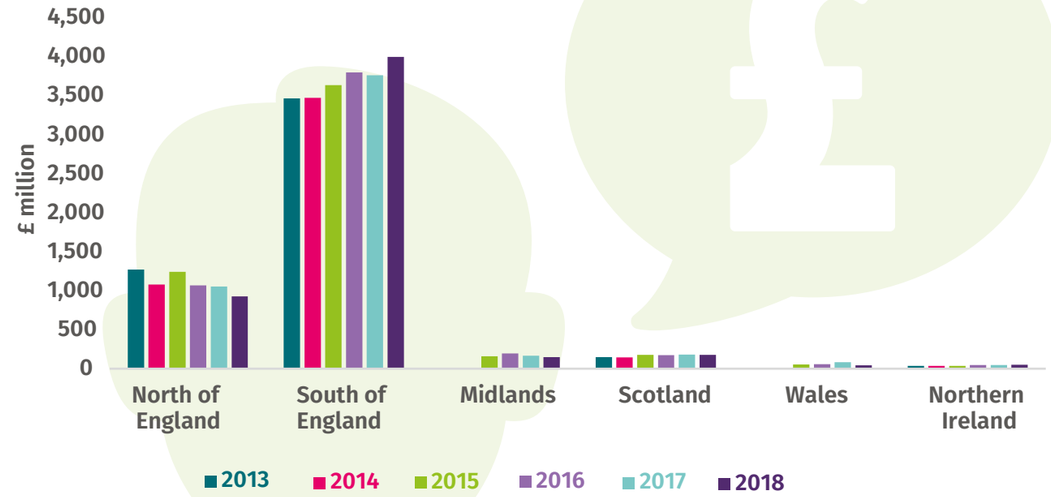
Change in public and charity health research spend by region, 2004/05–2018, %



Source: Author's analysis of UKCRC 2020, figures in real terms

FIGURE 3.3: THERE ARE ALSO INEQUALITIES IN PRIVATE R&D INVESTMENT

Private research spend by region, 2013–2018, chemicals and pharmaceutical industry, £million



Source: Authors' analysis of ONS 2019 and HM Treasury 2019, real terms

FIGURE 3.4: WALES, THE NORTH OF ENGLAND AND THE MIDLANDS HAVE IN PARTICULAR LOST INVESTMENT IN THE LAST 15 YEARS

Change in private research spend by region, 2013–2018, chemicals and pharmaceutical industry, %

Source: Author's analysis of ONS 2019 and HM Treasury 2019, real terms

THIS DIVIDE IS NOT BECAUSE WE DON'T HAVE REMARKABLE STRENGTHS ALL OVER THE COUNTRY

CASE STUDY 1: ENABLING TECHNOLOGIES IN SCOTLAND'S CENTRAL BELT

The central belt of Scotland has expertise and capacity crucial to the development of new health technologies and products – including in the internet of things, data analytics, hardware, digital manufacturing, and advanced manufacturing.

- In biotechnology, this area is home to the **James Hutton Institute**, the **IBioIC**,[3] and the **Scottish Association for Marine Science**.
- In advanced manufacturing, this area contains the **Advanced Forming Research Centre** and the **Centre for Innovative Manufacturing in Innovative Manufacturing in Laser-based Production Processes**.
- In photonics – critical to life science research in diagnostics and treatment – the area contains the **Fraunhofer Centre for Applied Photonics** and the **LiFi Research and Development Centre**.

3 Industrial biotechnology Innovation Centre

CASE STUDY 2: MEDICAL AND SOCIAL ASPECTS OF AGEING IN THE NORTH EAST

The UK's ageing population presents one of our greatest health challenges. Health research in this area will be critical to ensuring the NHS remains sustainable, that people live both longer and happier lives, and that the UK's productivity is maintained over the coming decades.

Technopolis analysis shows that the North has a particularly strong track record in accessing research funding on this topic, while the North East has a strong emerging cluster on this topic, including:

- **The National Innovation Centre for Ageing**
- **The Institute for Ageing and the Ageing, Health and Society Research Group**
- **Newcastle Helix**
- **The Newcastle Campus for Ageing and Vitality**
- **The Newcastle Innovation Centre for Data.**

This means the region has a network of leading ageing researchers, and an international reputation in this field. This is supported by significant academic infrastructure – such as Newcastle, Durham, Northumberland, Teesside, and Sunderland.

CASE STUDY 3: DATA AND DIGITAL INFRASTRUCTURE IN GREATER MANCHESTER AND CHESHIRE

Digital maturity in this region is 18 percentage points higher than the UK average across capability, enabling infrastructure, and readiness metrics (NHSA 2018). This has growth potential, which could support the development of precision medicine and realisation of real-world clinical trials. In particular, Manchester and Cheshire have:

- **developed the world's first digitally enhanced randomised clinical trial**, on a drug for chronic obstructive pulmonary disease (COPD)
- the **Health eResearch Centre**, delivering advances in healthcare using big data and bespoke institutes, like the **Farr Centre**
- membership of the **Northern Health and Science Alliance (NHSA)** and the **Connected Health Cities Programme**
- **identified 'fast-growth' potential in digital technology and big data**, through the science and innovation audit process (University of Manchester et al 2017).

CASE STUDY 4: MEDICAL TECHNOLOGY IN LEEDS AND YORKSHIRE

Leeds and Yorkshire lead in the development of medical technology – which, for example, supports our efforts to diagnose diseases earlier.

- **8.9 per cent** of MedTech patents submitted in the UK originate in the Leeds city region (ONS 2017b).
- The region has a track record of successfully attracting external funding.
- The area includes the Leeds-led **Medical Technologies Innovation and Knowledge Centre**; the **NIHR Musculoskeletal Biomedical Research Centre** and the **Translate Programme**.
- The region produces **12,000 MedTech graduates annually**, and has **4 per cent employment growth** per year on average.
- **140,000 manufacturing jobs**; particularly important in MedTech, where trials often need a technology to be fully developed (Leeds City Region 2017).

CASE STUDY 5: A GLOBAL EDGE IN THE GOLDEN TRIANGLE

The assets in the 'golden triangle' – Oxford, Camrbidge and London – are globally renowned. Indeed, it's often what people think of first when they hear life sciences. They have long-standing strengths in basic biomedical research, as well as:

- **London's Knowledge Quarter**: With world leading specialities in Muskulo-Skeletal pathology, emerging infectious diseases, anti-microbial Resistance (AMR), and machine learning – anchored by a rich vein of leading universities, the British Library and British Museum, and the new Francis Crick Institute (Knowledge Quarter London 2018).
- **Oxfordshire**: Oxford Thames Valley has over 160 digital health companies, and growth potential in health technologies supported by Oxford University and Oxford University Hospital (Oxfordshire Transformative Technologies Alliance 2017)
- **East of England**: A cluster containing One Nucleus, the Eastern AHSN, M11 Health Enterprise Forum, Med City, and the University of Cambridge – with assets around personalised and precision medicine (Greater Cambridge and Greater Peterborough LEP et al 2017).

However, we have remarkable strengths across the whole country. As investment increases, we should look to deliver on this potential, to deliver more inclusive growth.

WHY DOESN'T FUNDING AND SUPPORT FLOW TO THE EXCITING PROSPECTS OUTSIDE THE GOLDEN TRIANGLE?

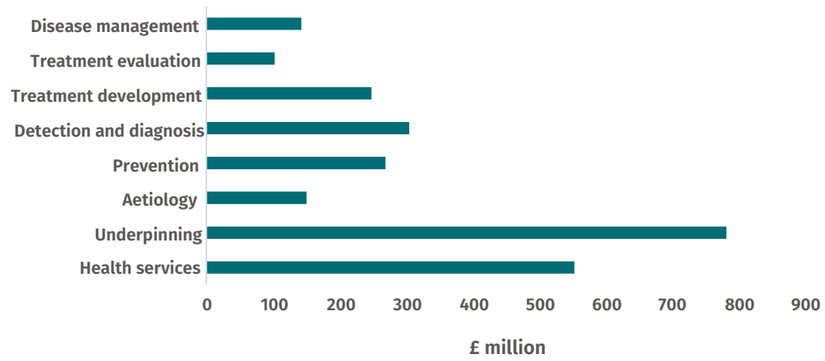
1. UK FUNDING IS SKEWED TO HOMOGENEITY

Two tangible elements of UK research funding cause difficulties for inclusive growth. First is the prominence of 'excellence' in research decisions. While excellence is obviously important, it predisposes the UK system to heterogeneous funding decisions. Would-be challengers – those who could be excellent with a little more support – are broadly blocked from the system, reducing competition (see Jones and Wilsdon 2018). If potential were better represented in public funding decisions, this could better support equality of opportunity and inclusive growth. UKRI is likely to need a more devolved structure to properly identify potential outside of the 'golden-triangle' (Jones and Wilsdon, 2019).

Second is a dissonance between the strengths outside the golden triangle, and traditional priorities. Life sciences, public sector, and charity spend tends to focus on understanding the origins and biology of a given disease – aetiology (the risks and causes of diseases) and underpinning (the development, detection, treatment, and management of diseases). This is often, but not always, lab-based.

FIGURE 3.5: PUBLIC RESEARCH FOCUSSES DISPROPORTIONATELY ON AETIOLOGY AND UNDERPINNING

Public and charity health research spend by research activity, 2018 (£ million)



Source: UKCRC 2020

These priorities tend to favour the South, which has substantial biomedical infrastructure. Using an uplift in public life science spend to diversify our priorities – for example, to include more prevention, translation and development – may help other regions to compete on a global stage.

2. THERE ARE INEQUALITIES IN THE INFRASTRUCTURE THAT DRIVES INVWESTMENT

Social infrastructure: A skill inequality

The life sciences rely on a huge range of skilled professionals – across STEM subjects and within the pharmaceutical and biotechnology sectors. However, we are falling behind Europe and the rest of the world in our domestic supply of skilled students (ABPI 2019). The ABPI skills survey shows the UK is particularly short of skills in clinical pharmacology, genomics, informatics, computational mathematics, and immunology (ibid).

This has a clear regional component. The qualification levels in the north of England are lower than for the England average (Round 2018). While 30 per cent of people hold a degree (or equivalent) in England overall, the average in the North is 25 per cent. This does not represent an insurmountable barrier. A more nuanced analysis shows significant untapped potential. The North East in provides a useful case study. Among younger age groups, skill level is increasing substantially.

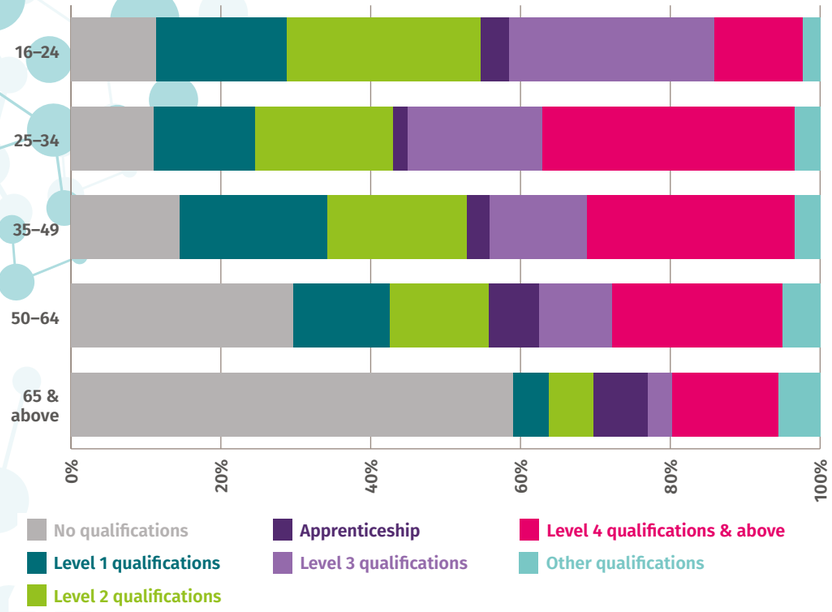


FIGURE 3.6: YOUNGER PEOPLE IN THE NORTH EAST ARE SUBSTANTIALLY BETTER QUALIFIED THAN THOSE AGED 50–64

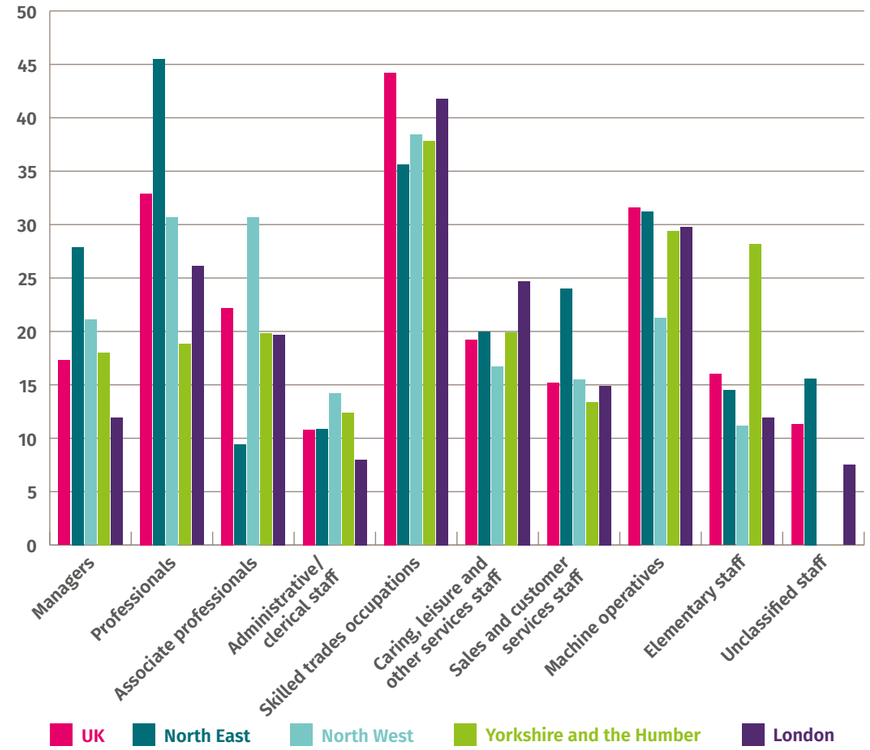
Percentage of population aged 16 and over with each highest level of qualifications, north east England (2011)

Source: Recreated from Round 2016; ONS 2011 census data via Nomis 2016

Yet, despite this, the region remains short on managerial, professional, skilled, and machine operative roles – many of which are critical to the life science sector as whole.

FIGURE 3.7: THE NORTH EAST HAS HIGH RATES OF SKILLS SHORTAGE IN PROFESSIONAL, SKILLED TRADES AND MACHINE OPERATIVE ROLES

Density of skills shortage vacancies in different occupations, UK and northern regions, 2015



Source: Recreated from Round 2016; UKCES 2016

A government approach to regional skills could take advantage of increasing qualification levels amongst young people in the North – and also provide technical education and apprenticeship opportunities for older adults – to significantly upgrade our domestic skills offer. Given variation in skills and skill-shortages between regions, this is likely to work better on a devolved basis.

3. THE NORTH HAS LESS ACCESS TO PATIENT CAPITAL

A key challenge for life science businesses, and particularly for small and medium-sized enterprises (SMEs), is the move from research to development (or from development to commercialisation and manufacture). The development and trial of a new molecule, or medical device prototype, is very expensive and require significant funding. "Innovative growth companies seeking to scale up" need access to venture and patient capital to become "reputable companies with global clout", as the Treasury put it in 2017 (HM Treasury 2017).

Yet, patient capital is often hard to access across the UK life science sector as a whole, and even more difficult to access for companies based outside of London (ibid). This wastes potential. For example, 97 per cent of life science companies in the North are small or medium-sized. Many could benefit from access to investment to enable them to scale-up their operations, and to keep their products within the country (UK Trade & Investment 2016).

Physical infrastructure: Connectivity inequality

Clustering is critical to successful life science activity. However, government-funding decisions mean the North is less well connected than the South, putting it at a significant disadvantage.

In the 21st century, connectivity means digital connectivity. The UK also faces a digital divide between the North and the South.

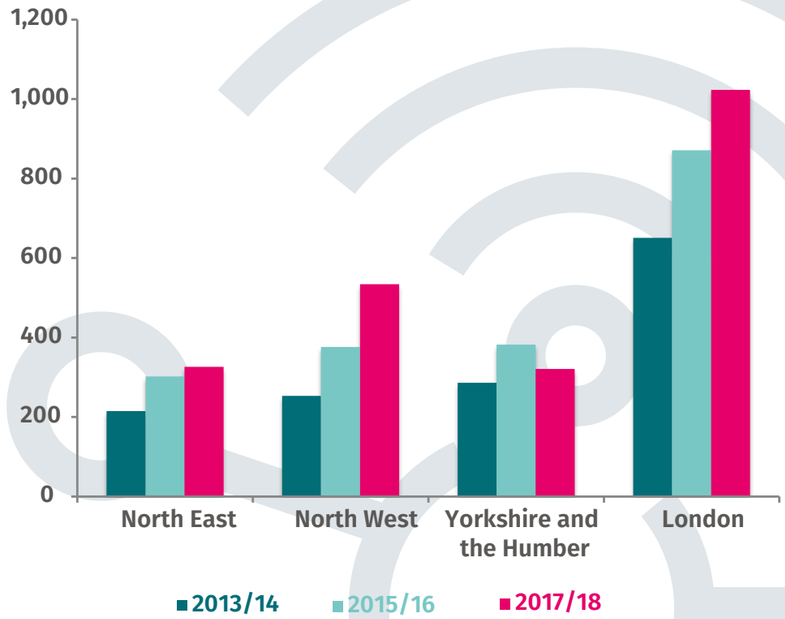


FIGURE 3.8: TRANSPORT SPEND IS UNEQUAL IN THE UK

Spending on transport (revenue and capital from central and local government) in the North and in London, £ per capita, 2007–18

Source: Raikes and Lockwood 2019

FIGURE 3.9: AS IS BROADBAND INFRASTRUCTURE

Percentage of households in a region with Internet access, 2017

Source: Authors' analysis of ONS 2017c

In combination, these factors limit partnership and clustering. But this is not inevitable. The Health Data Research UK hubs are a good example of how connectivity can be prioritised across the whole country.

SECTION 3
POLICY IMPLICATIONS

The same priorities we outlined for attracting investment to the whole country in section 2 can be aligned to the government's 'levelling up' agenda. This gives government a clear opportunity to support the whole country's life science sector – while also delivering funding and support to areas of high potential in our regions, that have otherwise been ignored. The ambition should be to extend equality of opportunity, to compete globally in a more diverse set of areas, and deliver maximum economic gains.

- **The government should fund potential, as well as excellence:** Research excellence is key to how research is funded in the UK. However, it often means that funding goes to the same places, limiting real competition. Government should better consider 'potential' in its decisions – that is, it should consider how investment can support fast-growth or progress towards global excellence within a field, place or region. Put simply, government should identify places, particularly outside London and the South East, that could grow quickly, and back them.
- **There should be significant devolution within UKRI.** NESTA have recently recommended devolution deals for cities and regions that can demonstrate the capacity to allocate R&D funding wisely – and a process to build capacity in those that need more support (Forth and Jones, 2020). This could help ensure research funders genuinely understand the potential and places across the country.
- **Government should focus on building skills capacity for the life science workforce.** A skilled workforce is a key priority for the life science sector – indeed, it was a full section in John Bell's life science industrial strategy. The UK should ensure its adult skills system has the capacity to provide those roles. As previously recommended by IPPR, devolution is key. Policies could include:
  - devolving technical education to cities (Round 2018)
  - establishing a body to help retain postgraduate research graduates in the regions (Round 2016)
  - improvements to business support for workforce training, particularly in R&D businesses (ibid)
  - Government could consider combining this with new standards for an apprenticeship schemes in the key life science vacancies, as recommended by others in the sector (ABPI 2016).

  More widely, government should ensure its immigration system does not accentuate existing gaps, as Brexit is finalised.
- **The government should seek to build connectivity across the country.** The UK invests significantly less on connectivity outside the South – curtailing business opportunities and growth. This is particularly significant for the life sciences, where clustering and interaction are so important. Government's commitments to innovation, R&D, and levelling up mean addressing this disparity. As previously recommended by IPPR North, government should devolve transport powers to the North, and ensure fairer funding allocations for the North (Raikes 2019).
- **The government should improve access to patient capital.** In the final report of the Commission for Economic Justice, IPPR highlighted the potential for:
  - a national investment bank, capitalised at £20 billion
  - the provision of equity financing for innovation, as an alternative to debt, as used in Finland, Israel, and Brazil
  - the creation of a National Factoring Agency, to help SMEs improve their cash flow, particularly to deal with delayed payment from early customers
  - a first customer guarantee, whereby government provides a guarantee to early customers of innovative start-ups, reducing their risk (CEJ 2018).

  The business bank has made progress on this – including through the Future Fund scheme. However, the funding involved and level of ambition should be expanded. One immediate option would be to make the popular Future Fund scheme – a loan provision, set up for businesses during Covid-19 – permanent. It could then be used to support the most innovative UK businesses with accessible, equity funding.

4. PILLAR 3: MAXIMISE VALUE

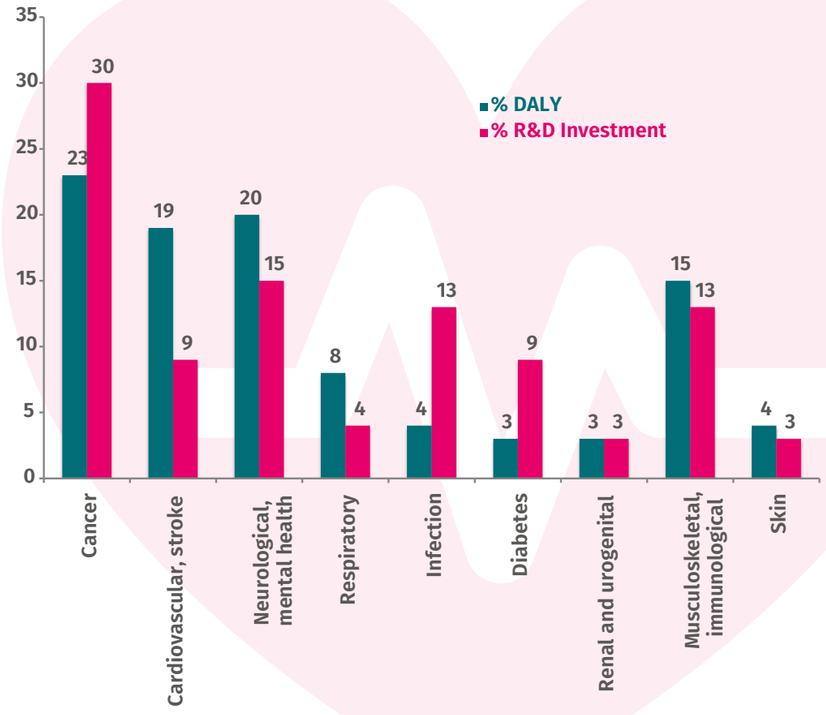
LINKING HEALTH AND WEALTH

We have argued that the government should invest in life sciences – both directly, and by providing social and physical infrastructure. In exchange, it can expect to achieve significant progress on its social and clinical priorities. Indeed, the government should have mechanisms to ensure this progress does happen.

First, this means addressing inequality in research funding between conditions. Some conditions – musculoskeletal, mental health, cardiovascular disease, and stroke among them – receive significantly less investment than their associated 'disability adjusted life years' (DALYs) would predict.

FIGURE 4.1: DISEASE BURDEN DOES NOT PERFECTLY PREDICT R&D INVESTMENT

Private, public, and charity spend by major conditions

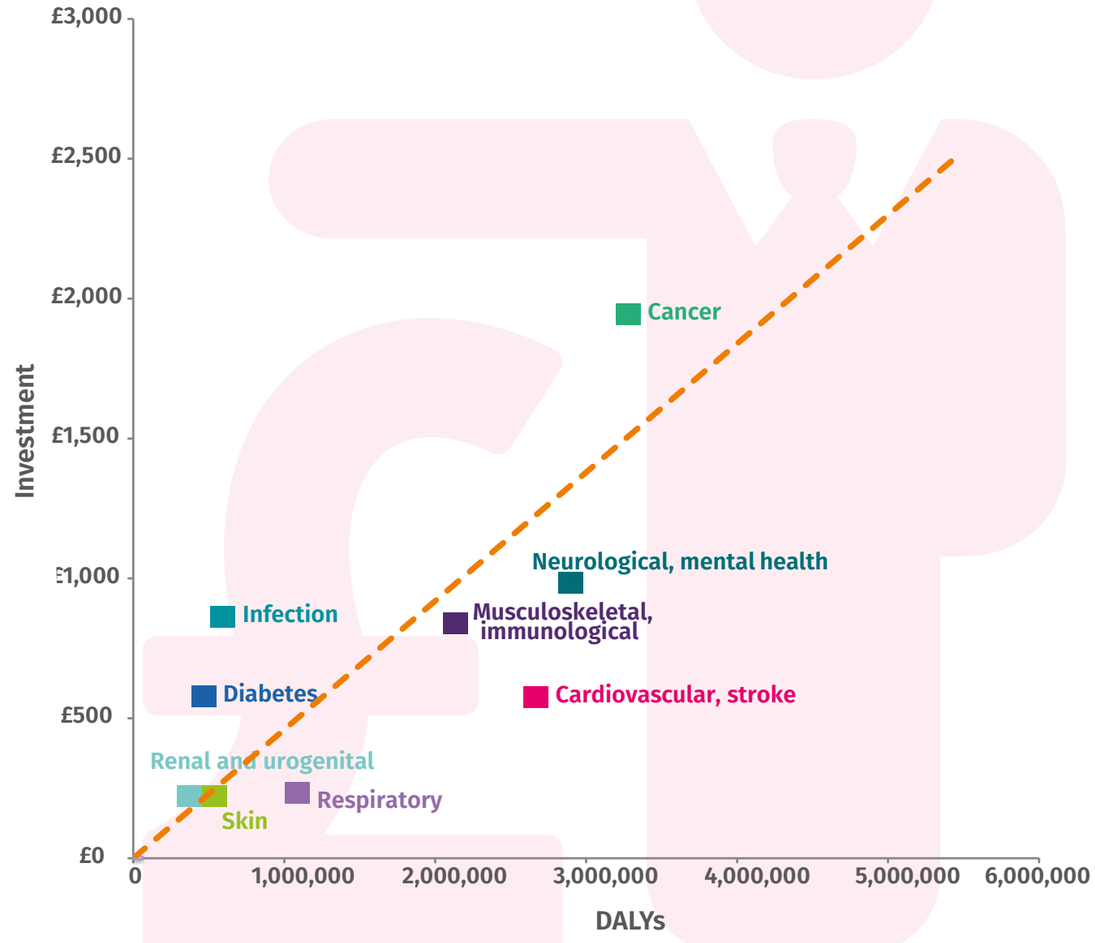


Source: CF analysis of ONS 2020d; Pharma Intelligence Informa 2019; MRC 2018; Cancer Research UK 2019; Versus Arthritis 2019; NIHR 2018; UK CRC 2020; British Heart Foundation 2019; Institute for Health Metrics and Evaluation 2017

While cancer receives £593/DALY, mental health and neurological conditions only receive £339, and musculoskeletal conditions only £392. Bringing every condition in figure 4.2 up to the line would require £1.27 billion of investment.

FIGURE 4.2: DISEASE BURDEN DOES NOT PERFECTLY PREDICT R&D INVESTMENT

Private, public, and charity spend by major conditions



Source: CF analysis of ONS 2020d; Pharma Intelligence Informa 2019; MRC 2018; Cancer Research UK 2019; Versus Arthritis 2019; NIHR 2018; UK CRC 2020; British Heart Foundation 2019; Institute for Health Metrics and Evaluation 2017

A one size fits all and condition-specific approach is unlikely to provide the best value.

Government should create a new £1.3 billion investment fund. This should be tasked with catalysing investment across 'under-served conditions' – but also to allocate funding where it will be most impactful. This fund should be governed by a new board of representatives from charity, academia, and patient groups – and should predominantly focus on cross-condition research.

A DECADE OF HEALTH DISRUPTION

HEALTH CHALLENGES IN THE 21ST CENTURY ARE VERY DIFFERENT TO THOSE OF THE 20TH

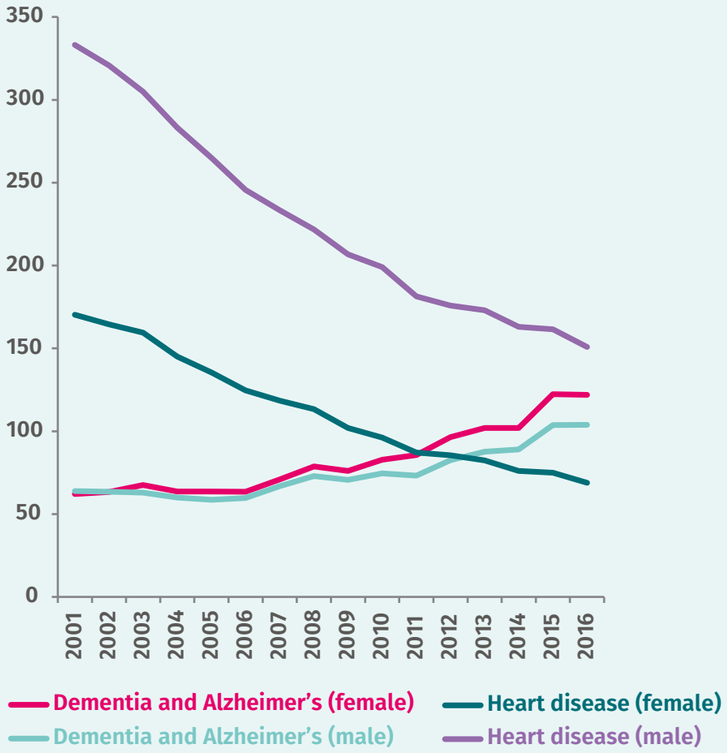
Health challenges are changing. Where the 20th century faced acute conditions, today the biggest drivers of mortality and morbidity are often acute and long-term. Dementia will become the UK's biggest killer in the coming years. Mental health is increasing in prevalence. And global health challenges – from pandemics to antimicrobial-resistance (AMR) – are becoming more pressing.

And antimicrobial resistance is rising

- 123 countries report extensive, multi-drug resistant tuberculosis.
- Up to 2 billion people lack access to antimicrobials globally.
- 700,000 people die, annually, from drug resistant infections.
- Antibiotic use continues to rise – and is estimated to triple by 2030.
- No new antibiotics have been discovered and made available since the 1980s (HM Government 2019).

FIGURE 4.3: THE LEADING CAUSE OF MORTALITY IN THE UK IS CHANGING

Comparison of mortality trends, dementia and Alzheimer's, and cardiovascular disease, 2001–16



Source: Public Health England 2018

MISSION-BASED APPROACHES

These challenges are long-term and expensive to address. As such, they are not incentivised by the market. If government wishes to address them proactively, it will need to actively intervene.

Best would be a 'mission-based approach' (Parkes 2019; CEJ 2017).

A 'mission-based approach' has three traits:

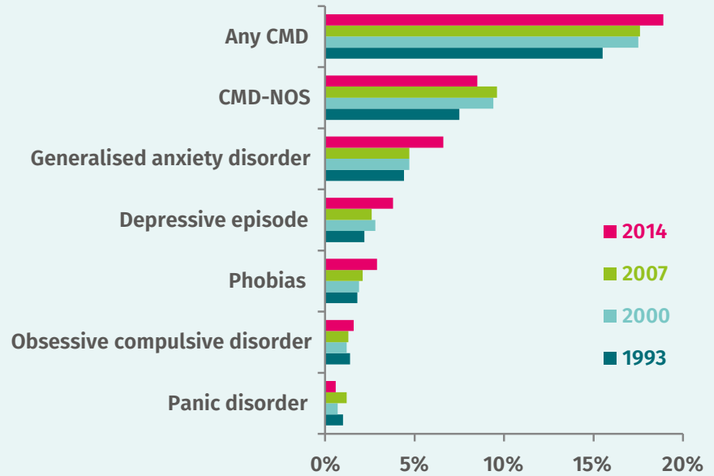
- the establishment of a long-run goal and a broad plan for meeting it
- a set of support policies to support achievement
- a clear commitment on associated spending (Parkes 2019).

Missions are effective at accelerating progress, and also at 'crowding-in' private investment (ibid). Government have begun to employ this approach; for example, through the ageing society 'grand challenge'. They must now go further and faster.

THREE LIFE SCIENCE MISSIONS TO LINK HEALTH AND WEALTH

FIGURE 4.4: COMMON MENTAL HEALTH DISORDERS ARE INCREASING

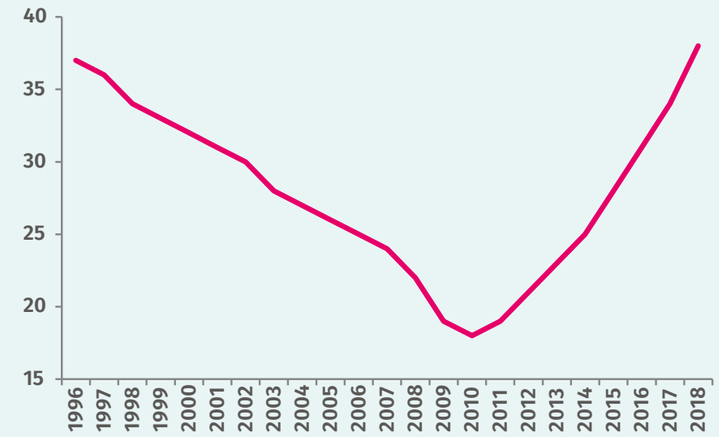
Prevalence of common mental health disorders, 16–64 year olds, 1993–2014



Source: Author's Analysis of NHS Digital 2016

FIGURE 4.5: MAJOR GLOBAL DISEASE OUTBREAKS ARE BECOMING MORE COMMON

Number of countries reporting major disease outbreaks by year, World Health Organisation reports



Source: Recreated from World Economic Forum 2018

MISSION 1: PUT LIFE INTO LIFE EXPECTANCY

The under-funding of mental health and MSK – major drivers of disease morbidity – suggests that investment has focussed on quantity of life, rather than quality of life. However, in recent decades, there has been a significant increase in the gap between healthy life expectancy, and life expectancy. Research now needs to focus on reducing the number of years people live in poor health.

MISSION 2: LEARN TO MANAGE MULTIPLE CONDITIONS

In the 20th century, health services focused on treating acute conditions. In the 21st century, the challenge is more often chronic, long-term conditions. Over the coming decades, and combined with an ageing population, a new challenge will be multiple-conditions – both physical and mental. A new mission should pre-empt this trend, to help ensure we can meet it head-on.

MISSION 3: GET ONE STEP AHEAD OF EMERGING AND GLOBAL HEALTH RISKS

We are currently facing three of the most severe global health threats in modern history: the continued threwat of global pandemics, including coronavirus and influenza; a rise in antimicrobial resistance; and increasing mortality from untreatable neurological diseases, like dementia, associated with ageing. A final mission should support progress and resilience against these threats to health standards – in the UK and globally.

SECTION 4
POLICY IMPLICATIONS

- **The government should provide a £1.3 billion research fund, with governance by charity, patient representatives, business, and academia, to work on 'underserved' research areas.** This fund should focus on high impact research that cuts across different conditions.
- **Government must address a coming 'decade of health disruption'.** They should do this by setting out new research missions – on healthy life expectancy, multiple conditions, and global health challenges. This will de-risk areas where private investment is poorly incentivised and help link public need and priorities to research activity.

5. POLICY IN PRACTICE: LESSONS FROM COVID-19

LESSONS FROM COVID-19

The ongoing Covid-19 outbreak has led to a substantial global research effort, across government, charities, industry and the academic community. Indeed, it provides a strong case study of the mission-based principles outlined in the previous chapter. The sheer scale of events served as a clear demand signal. The UK subsequently put in place tailored policy instruments – for example, by relaxing regulatory requirements for vaccines and treatments – and created clear and accessible funding pots. This included £20 million through the Medical Research Council (MRC), NIHR, and the Department of Health and Social Care (DHSC) – and many more millions from charities, foundations and trusts.

This led to a significant global R&D response. As of 1 April 2020, just weeks after the outbreak had been declared a pandemic, PubMed lists almost 2,000 Covid-19 peer review papers. There were also at least 14 companies with a medicine in early phase research; five with a medicine in phase one of development; three with a medicine in phase two of development; and a further company with a medicine in phase three trials. This breadth is remarkable given that the disease only emerged a matter of months ago.

However, although we've moved quickly in some places, we've lacked capacity in others. For example, while UK companies lead on vaccine science and development, our vaccine production capacity is very small. Production in the UK focusses on two facilities in Liverpool – one producing nasal vaccines (20 million doses per annum) and the other injection vaccines (approximately 50 million doses per annum).

Of course, Covid-19 should not lead to knee-jerk investment. It would not be sensible for the government to now take a reactive approach. Rather, the key lesson of Covid-19 is how a strong life science sector – with strong component parts and partnerships, from across sectors – can provide resilience and insurance. Had the principles of this report been in place before Covid-19, we might have had significant advantages.

INCREASED INVESTMENT

Covid-19 highlights the case for strong investment in the life sciences as part of government's overarching R&D strategy. There is a clear need to increase preparedness against 'black swan events'. This does not just mean infectious disease, but also the ageing population, the growing inefficacy of antibiotics, and climate change. Government should ensure funds are available for this purpose – and that there is flexibility to target those funds to the kind of capacity (research, development, translation, or manufacturing) that is needed.

LEVELLING UP

Liverpool and Cheshire is an area with significant strengths in infectious disease. However, it is not in the golden triangle, where the vast majority of UK public investment goes. A levelling-up approach would have likely developed this region as a leader, increasing R&D, company diversity, manufacturing capacity and workforce capability. This is the kind of missed opportunity that a narrow strategy causes.

MAKING HEALTH GAINS

It is hard for the market to justify investment in long-term, global threats – as they are so unpredictable and (in any given year) unlikely. Use of the kind of mission-based framework outlined in this report could have helped to rectify this market failure, before Covid-19 hit. As has been documented, many had identified the risk of pandemics – including the World Economic Forum. Mission based research gives government more ability to react to the challenges of black swan events, with sound investments based on insuring us against the extreme costs of events too unlikely to entice proactive private investment (in large quantities).

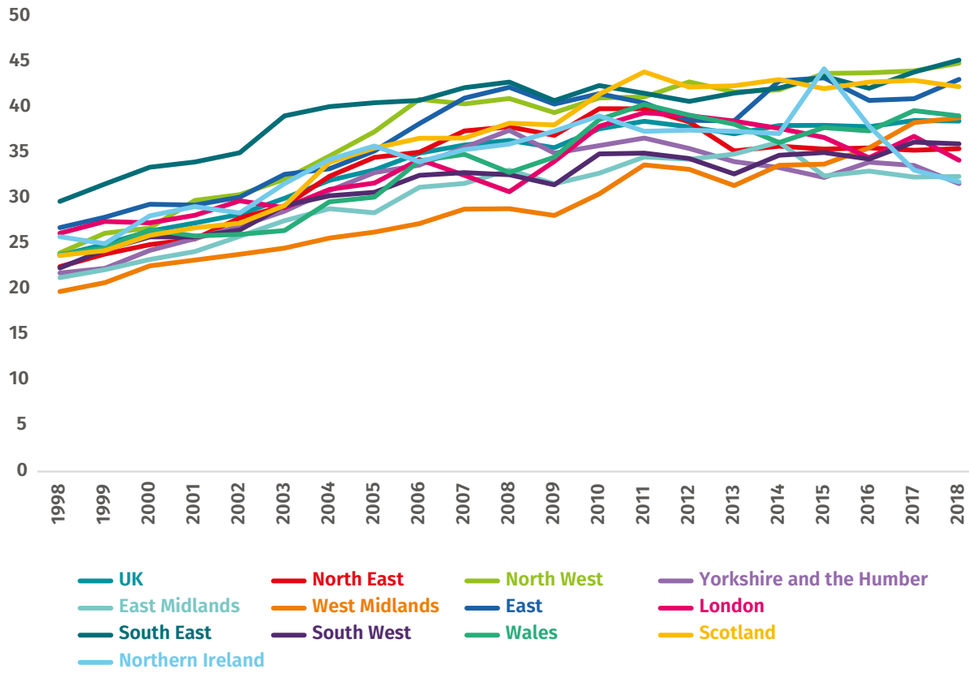
CASE STUDY: THE ROLE OF MANUFACTURING

We identified manufacturing as a high priority area in section 2 – to ensure the UK has access to (and commercial benefit from) its own science. It also insures us against black swan events like Covid-19 – where our capacity to produce vaccines could constrain our ability to ensure the UK's health, or to support the international humanitarian response.

There are many regions in the UK that perform well on manufacturing, including those outside the South East.

FIGURE 5.1: AREAS OUTSIDE THE SOUTH EAST HAVE PRODUCTIVE MANUFACTURING SECTORS

Labour productivity by region, all manufacturing, 1998–2018



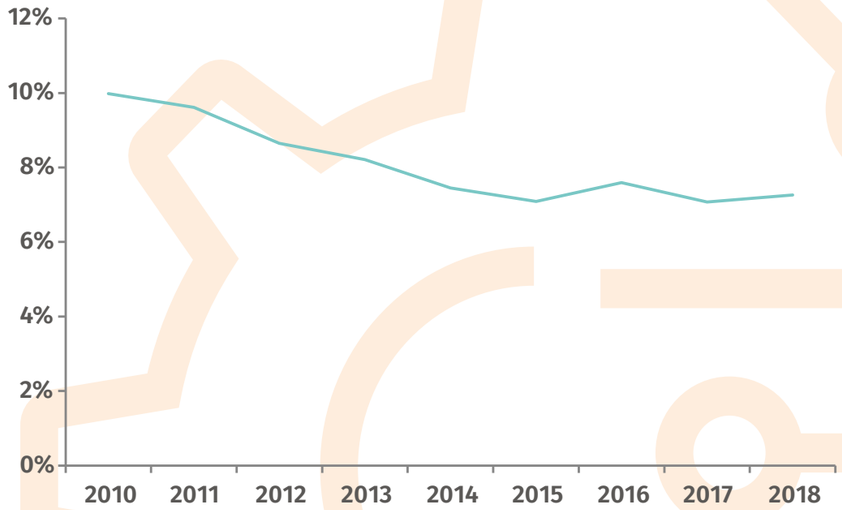
Source: ONS 2020e

By contrast, pharmaceutical manufacturing in the UK has produced a lower share of value, relative to the wider manufacturing sector.

The impact of this can be seen, as one example, in our ability to produce vaccines to support both national and international efforts against Covid-19.

FIGURE 5.2: LIFE SCIENCE'S CONTRIBUTION TO THE UK'S TOTAL MANUFACTURING GVA (PERCENTAGE) HAS REDUCED SINCE 2010

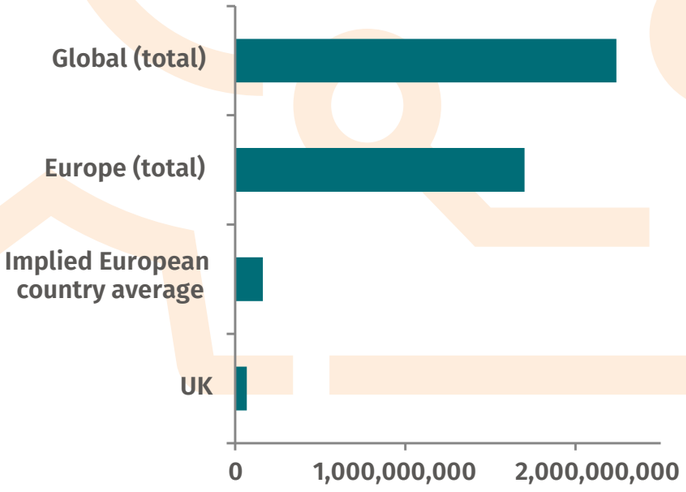
Pharmaceutical manufacturing GVA as a per cent of total manufacturing GVA, 2010–2018



Source: Carnall Farrar 2019

FIGURE 5.3: THE UK HAS RELATIVELY LITTLE VACCINE MANUFACTURING CAPACITY

Estimated current vaccine manufacturing capacity (doses)



Source: Vaccines Europe 2019

Manufacturing investment, when it does come, tends to stay. The key is attracting it A sensible approach would be a new grant function – providing up to £30 million per annum until the end of the parliament - to support new manufacturing investment. These grants should be focussed on the areas where the benefit would be highest (ABPI et al, 2016). They should also take into account where the UK can best contribute to international need, in support of strong, global supply chains.

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